

ASSEMBLY MANUAL

MATERIA 101

REVISION 04
24 NOVEMBER 2014



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Materia 101 is designed by Sharebot for Arduino.

01

INTRODUCTION

We are excited that you have decided to take part in this new industrial revolution. Like all new technology, it is pioneers like you who will lead the real innovation. Your new Arduino 3D printer will give you the freedom to create all the objects you can imagine.

This machine is the latest result of the experience we have collected through all the previous models. Your advice will help us to improve our products and together with you, we can set new standards for future desktop printers.

We believe that sharing is the best way to innovate so we invite you to tell us your thoughts at www.arduino.cc

We look forward to seeing what you will create with the Materia 101!

Please note: any parts that you have left over at the end of the assembly, keep them: they should be used as spare parts in the future.

02

KIT CONTENTS

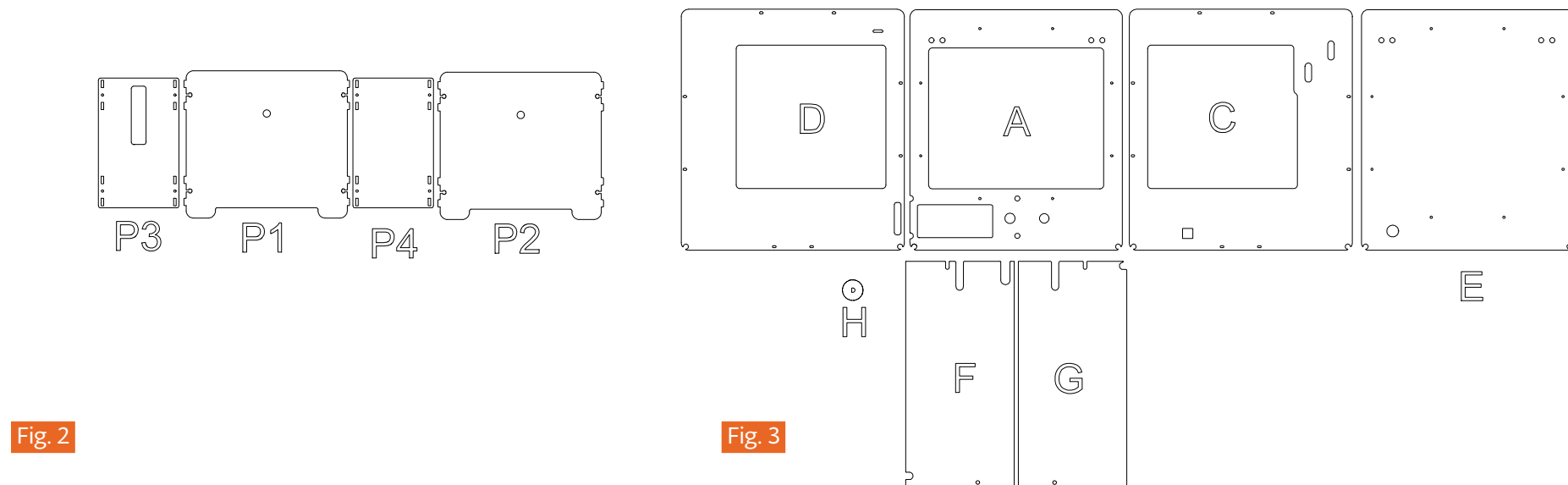
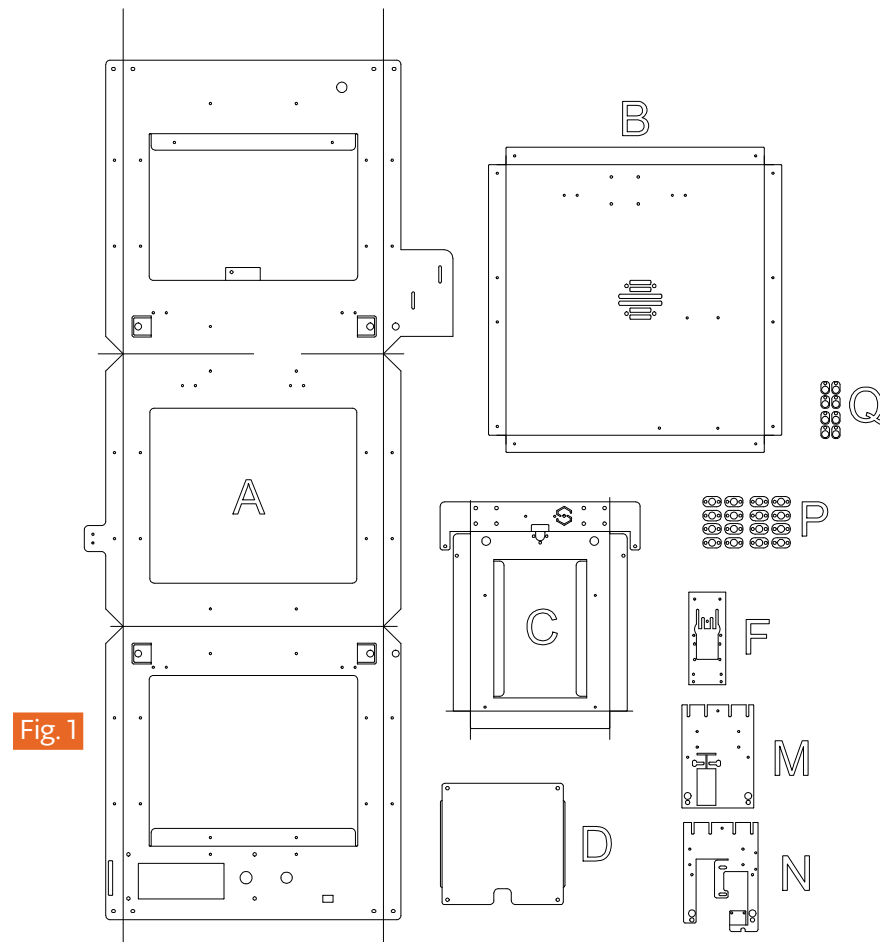


Fig. 3

BASE DIAGRAM:

- A - Main frame
- B - Bottom tray
- C - Z Carriage
- D - Printing bed
- F - X Carriage
- M - Y Left Shoulder
- N - Y Right Shoulder
- P - Y Z Bearing guides
- Q - X Bearing guides

Fig. 1

PLEXI CASE DIAGRAM:

- P1 - Spool Holder
- P2 - Spool Holder
- P3 - Spool Holder
- P4 - Spool Holder

Fig. 2

- A - Front of case
- B - Top of case
- C - Right of case
- D - Left of case
- E - Back of case
- F - Left bottom of case
- G - Right bottom of case
- H - Control Knob

Fig. 3

KIT CONTENTS

KIT CONTENTS:

BOX A

- D8 guide
- Hairspray
- Z axis stepper motor
+ brass nut block
- Plexi kit
- Arduino Materia
101 stickers

A1

- Ramps shield
- Stepper drivers (5)
- Labels

A2

- LCD
- LCD cable

BOX B

- SD card
- D6 guide
- F; M; N; D and C
metal components
- M10 cap nuts (2)
- Stepper motors (2)
with X/Y pulley
- Extruder stepper motor
- 1.5 Allen key
- 2.5 Allen key

BOX C

- Arduino Mega 2560
- 220V power cable
- USB cable
- Glass printing surface

C1

- 12V 5.2A power supply

C2

- Z bearing

C3

- Z bearing

C4

- End-stops (3)

C5

- Heat sink grease

C6

- LM8UU bearings (8)
- Seeger rings (12)

C7

- Pre-assembled hot-end
- Thermistor 100K

C8

- Grey cable (extruder
carriage wiring)
- Grey cable (X axis
carriage wiring)

C9

- Pulleys (5)
- M3 grub screws (5)
- 620mm belt
- 500mm belts (2)
- 160mm belt

C10

- 40x40 fans (3)

C11

- 8n nylon bearing carrier
- Adhesive feet (4)
- O-rings (2)
- 5mm 3x6 teflon
stand-offs (2)
- 3x6mm teflon tube
- M3 lock nut
- M3x25 bolt

C12

- Display knob
- ON/Off switch
- Switch sleeve

- Socket

C13

- 3 wire end-stop cables (2)

C14

- M4 Z axis adjustment screw
- M3x25 bolts (4)
- M3x40 bolts (2)
- M3x35 bolts (4)

C15

- PVC extruder block
- PVC extruder idler
- M4x15 bolt
- M3x15 bolts (4)
- D5 springs (4)
- 624ZZ bearing
- Steel cable support plate

C16

- 2.5x100 nylon cable tie
- D10 springs (4)
- M4x8 bolts (8)
- M3x25 bolts (4)

C17

- M3x6 bolt

KIT CONTENTS

C18

- M3x10 bolt

C19

- M3x20 nylon stand-offs (6)

C20

- M3 nuts (12)
- Washers (4)

C21

- M3x10 nylon stand-offs (8)

C22

- X/Y metal rod guides (8)
- Z metal rod guides (16)
- D6 bearings (4)

C23

- Clips (2)
- M3x10 nylon stand-offs (2)
- Small shrink tube
- 4 wire cables (2)
(Z and Y motors)
- Pulley
- Brass gear wheel
- M3 grub screw
- Bipolar cable for
power switch
- M3x6 bolts (10)

- Kapton tape

C24

- Spiral cable wrap
- Large shrink tube
- Medium shrink

C25

- White LED strip
- LED bipolar cable
- Red connectors (2)

TO COMPLETE THE
ASSEMBLY YOU WILL
NEED THE FOLLOWING
TOOLS:

- 2.5 Allen Key
- 1.5 Allen Key
- 3 Allen Key
- Medium size cross head
(Phillips) screwdriver
- Small size flathead
screwdriver
- Seeger pliers
- Scissors
- Soft solderer
- Multimeter
- Soldering Tin
- Adhesive tape
- Hair dryer or lighter

NOTES

Screws could loosen because of damage or from vibration so use threadlock on each screw that touches a metal part. Threadlock is a liquid that fills in the gaps between the threads of screws and hardens into a rubber like substance or glue.

We suggest Loctite 221, a low resistance threadlocker for the some screws. You can also use teflon tape.

We suggest using sewing machine oil to lubricate the Z axis bearings and guide rods.

Arduino’s Materia 101 Assembly Kit is meant for a user who already has experience with assembly. The manual assumes the user knows how to use a soldering iron.

03

BASE ASSEMBLY

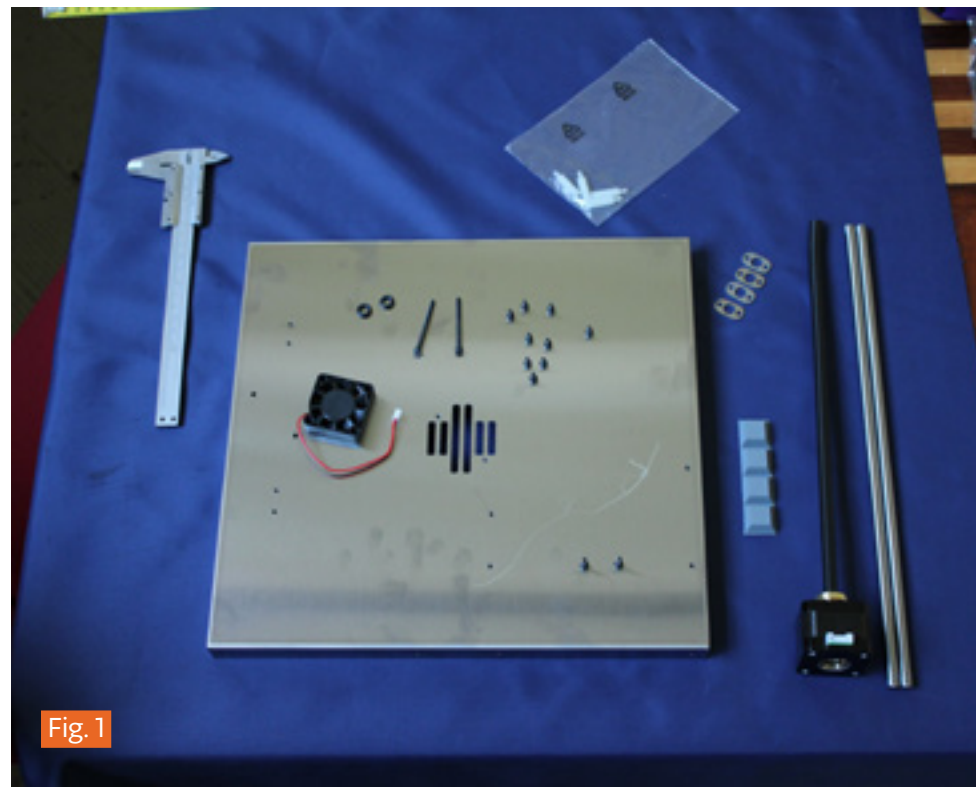


Fig. 1

To complete this part you will need:

- Bottom tray
- Rubber feet (4)
- Z axis motor with already connected lead screws
- Z support bars
- Metal rod guides (4)
- M3x35 allen bolts (2) to secure the motor
- Arduino Mega 2560 board and Ramps shield
- M3x20 nylon stand-offs(3)
- O-Ring to assemble motor
- 40x40 fan
- M3x6 bolts (8)
- M3x10 bolts (2)

Fig. 2

Take the bottom tray and turn it over so the flat side is facing upwards.

Fig. 3

Separate each foot.

Fig. 4

Paste a foot to each corner.

BASE ASSEMBLY

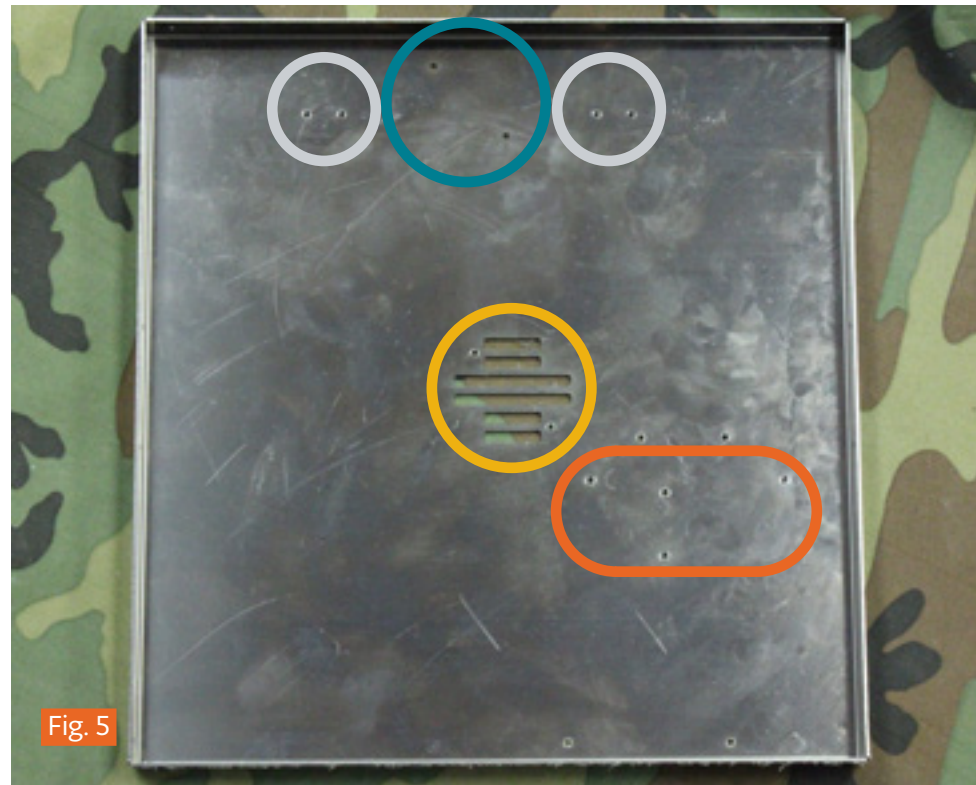


Fig. 5

Turn over the bottom tray again. In the picture you will see colored areas for the metal rod guides in grey, Z axis in blue, Arduino Mega 2560 in orange and the fan is in yellow.

Fig. 6

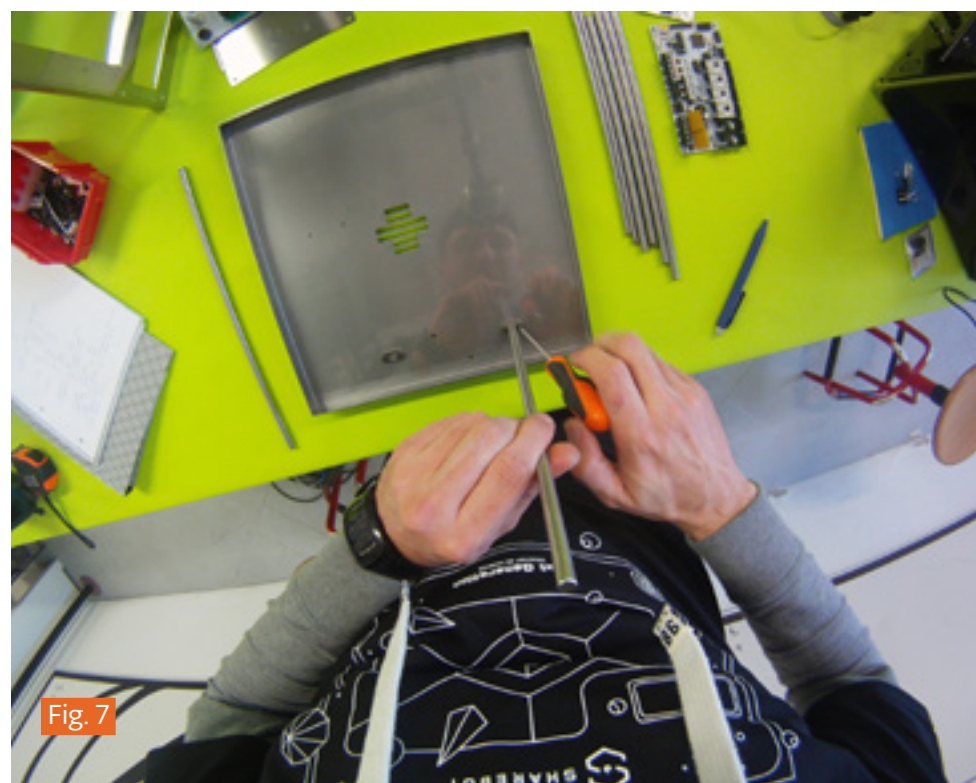
Take the metal rod guides (4) and pair them then attach them to the bottom tray. Without tightening, hold them in place with M3x6 bolts (2).

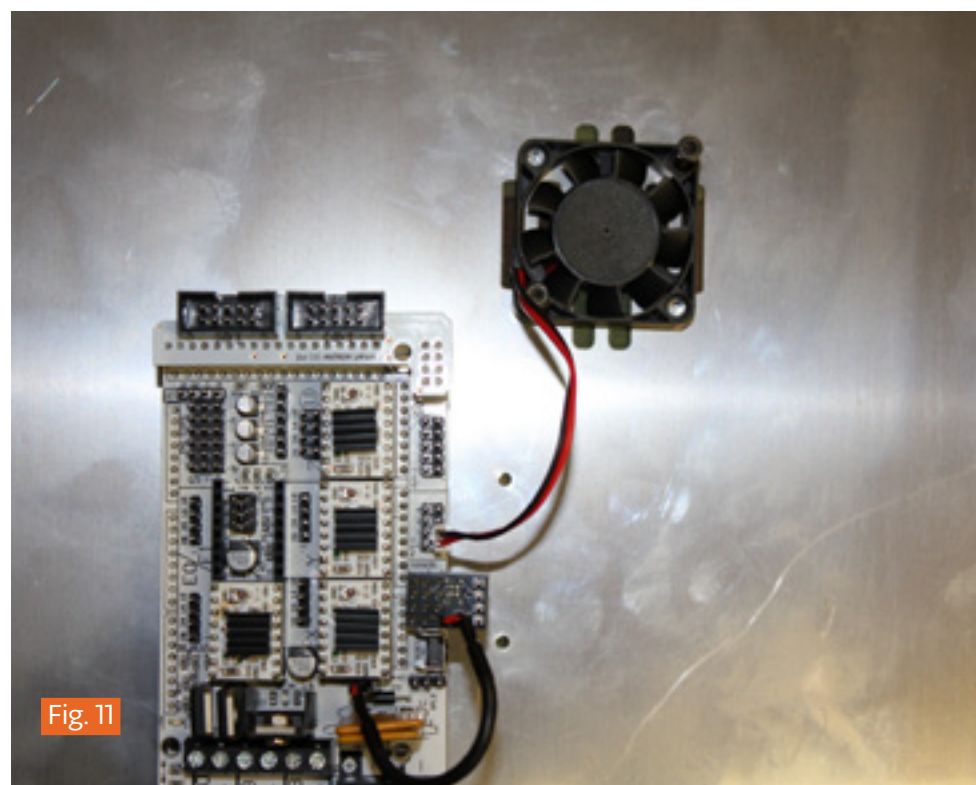
Fig. 7

You can use the Z axis D8x338 guides to center them before tightening.

Fig. 8

Take M3x20mm nylon stand-offs (3) and carefully tighten them. Do this step by hand, to not damage the nylon thread.





BASE ASSEMBLY

Fig. 9

Lay the Arduino Mega 2560 board on the stand-offs and secure the control board to the base using M3x6 bolts (3). Once again, be really careful not to damage the nylon thread.

BLACK, fasten through the threaded holes at the center of the tray.

Fig. 10

Place the Ramps board on the Arduino's and connect it through the pins paying attention not to bend it. Attach heat sinks (4) to the motor's driver. Inside the kit there is another driver that could be used as a spare part.

ATTENTION: THE HEAT SINK MUST NOT TOUCH THE PINS.

Fig. 11

Place a 40mm fan with the label facing downward, the cable pointed towards the board and connect the fan to the plug specified on the board, as you see in the picture (fig. 11).

Paying attention to polarity, + RED –

BASE ASSEMBLY

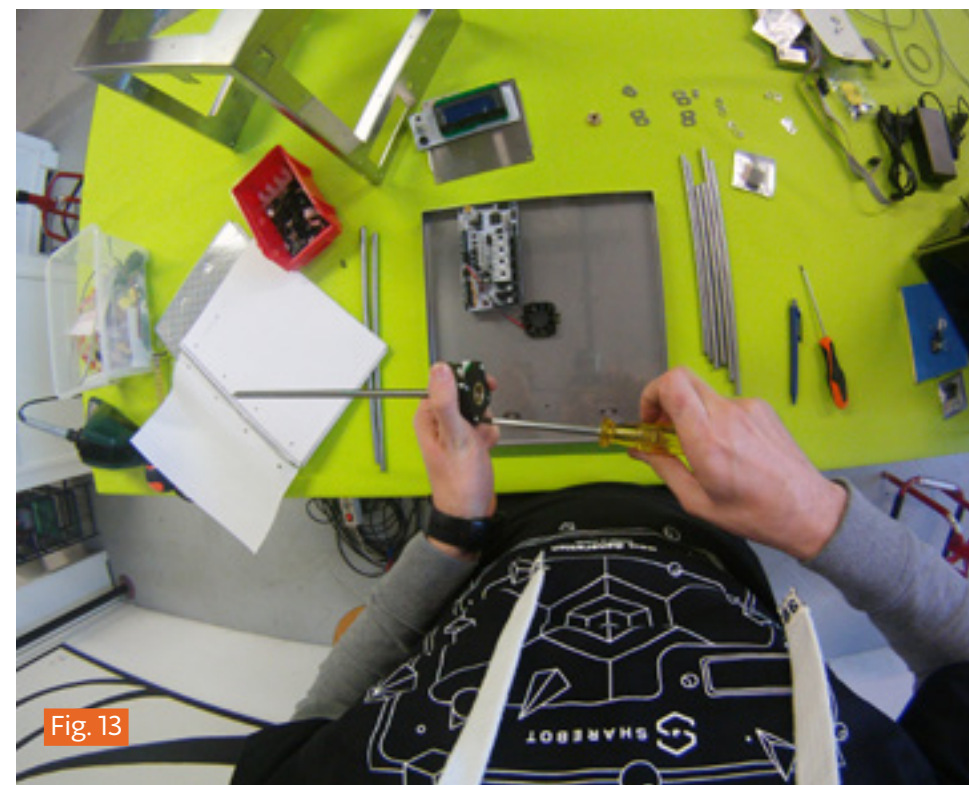
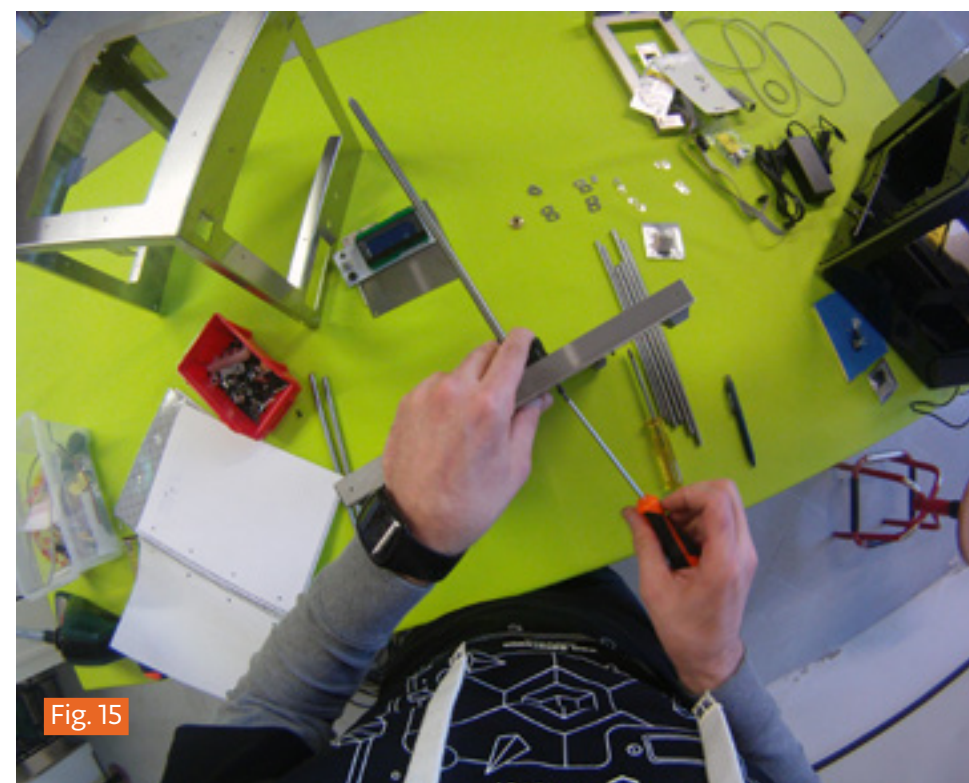
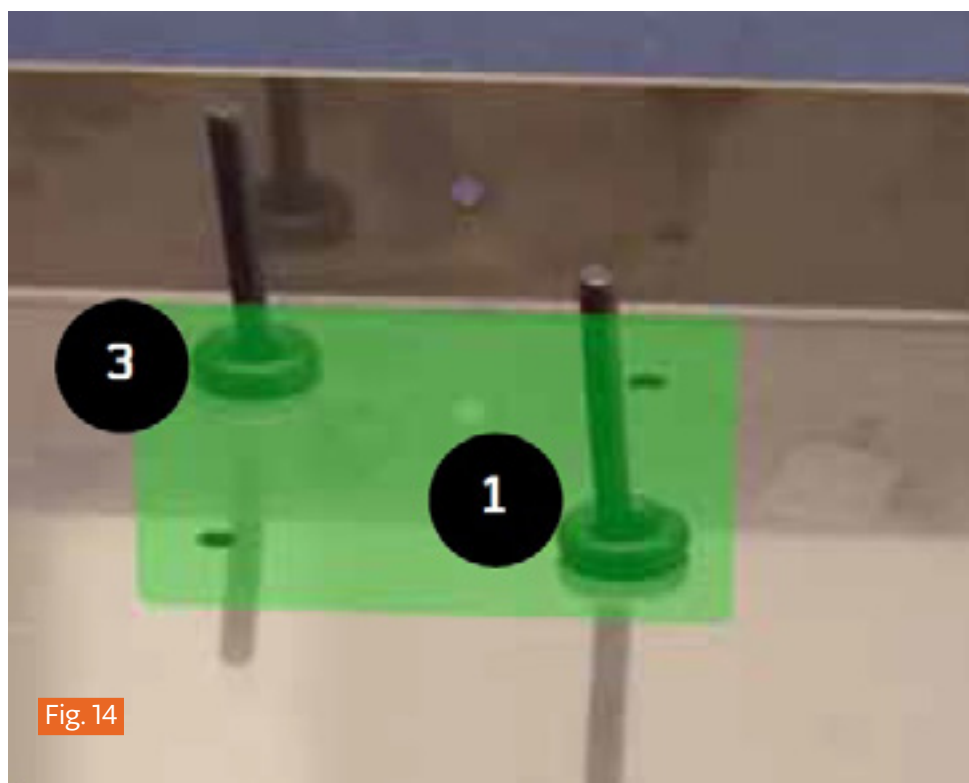


Fig. 12 - 13

Remove screw no. 1 and 3 with a crosshead screwdriver (fig. 12) from the bottom of the tray (fig. 13).

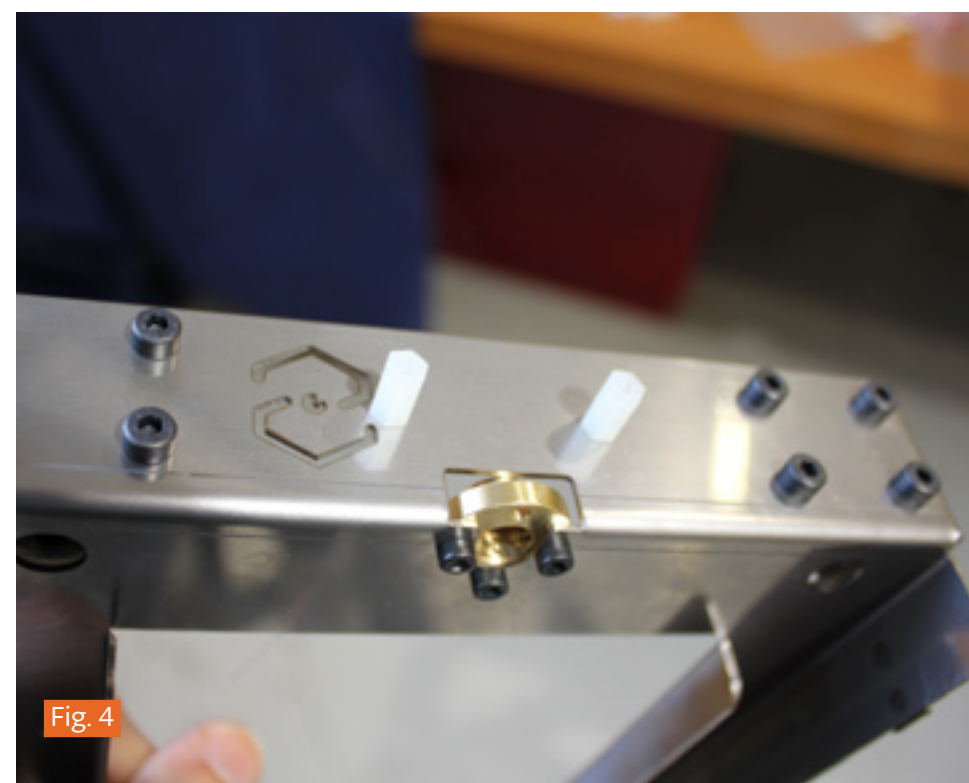
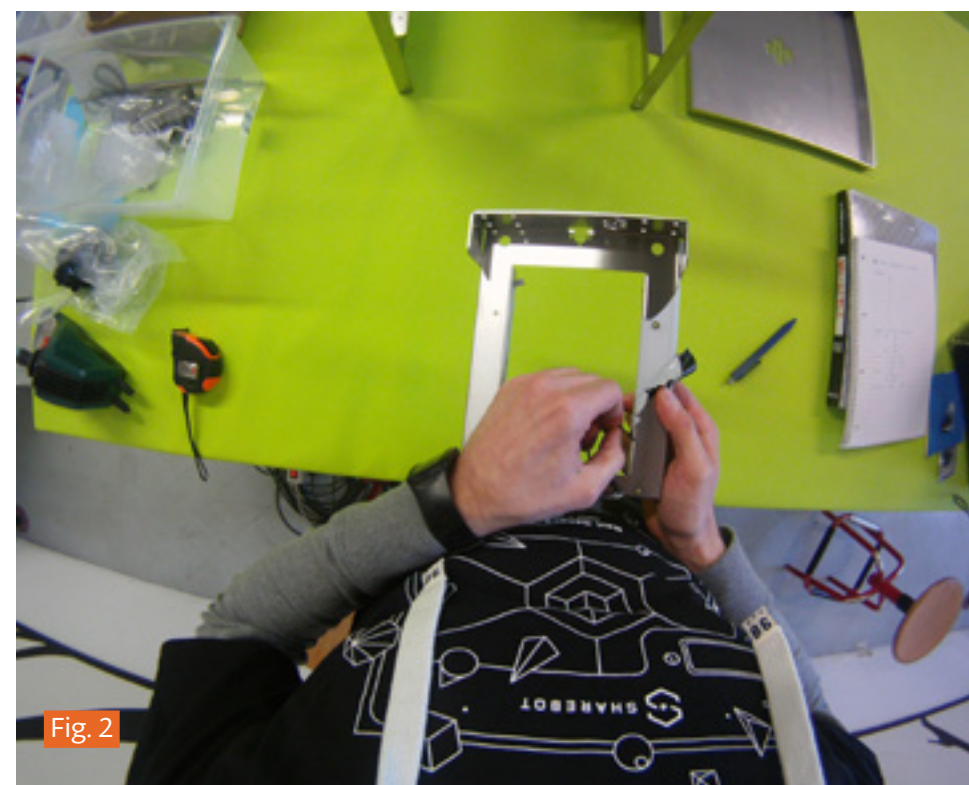
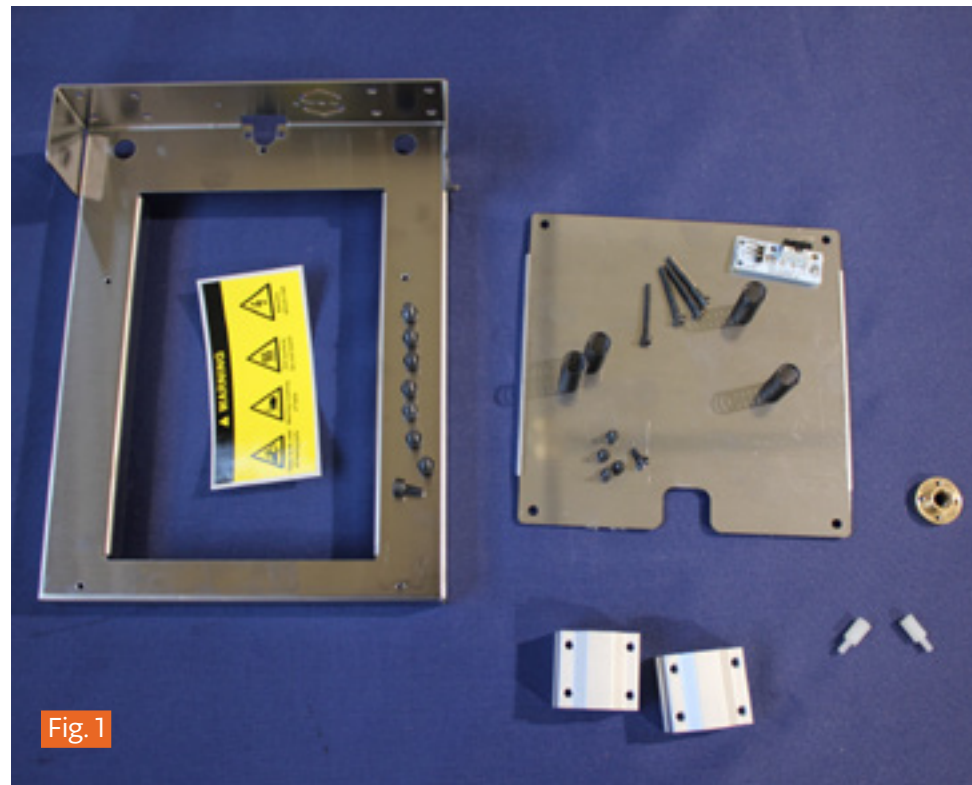
Fig. 14 - 15

Secure the Z motor. You need M3x35 bolts (2) and o-rings (2). O-rings are necessary to soften the motor vibrations. Put M3x35 bolts in position 1 and 3 from the rubber feet side. From the other side of the tray, place o-rings on the bolts then tightly secure the Z motor to the bolts. The o-rings must lie under the motor. Remove the bar cover and unscrew the brass nut block from the Z screw.



04

ASSEMBLYING THE PRINTING BED



ASSEMBLYING THE PRINTING BED

Fig. 1

- Z carriage
- D8 linear bearings (2)
- M4x8 bolts (8)
- M3x25 bolts (4)
- D10 springs (4)
- Printing bed
- Security sticker
- M3x10 nylon stand-offs (2)
- M3x6 bolts (5)
- End-stop sensor
- Z nut brass journal box

Fig. 2

Remove the plastic wrapping from the Z carriage.

Fig. 3 - 4

Place the bearings on the carriage's print bed side and use M4x8 bolts (4) to secure it, as in the picture. Tighten the M3x10 nylon stand-offs (2) on back part (opposite to the bearings).

Be very careful since they are plastic. Take the brass nut block from the Z motor and tightly secure with M3x6 bolts (3) to the Z carriage.

ASSEMBLYING THE PRINTING BED

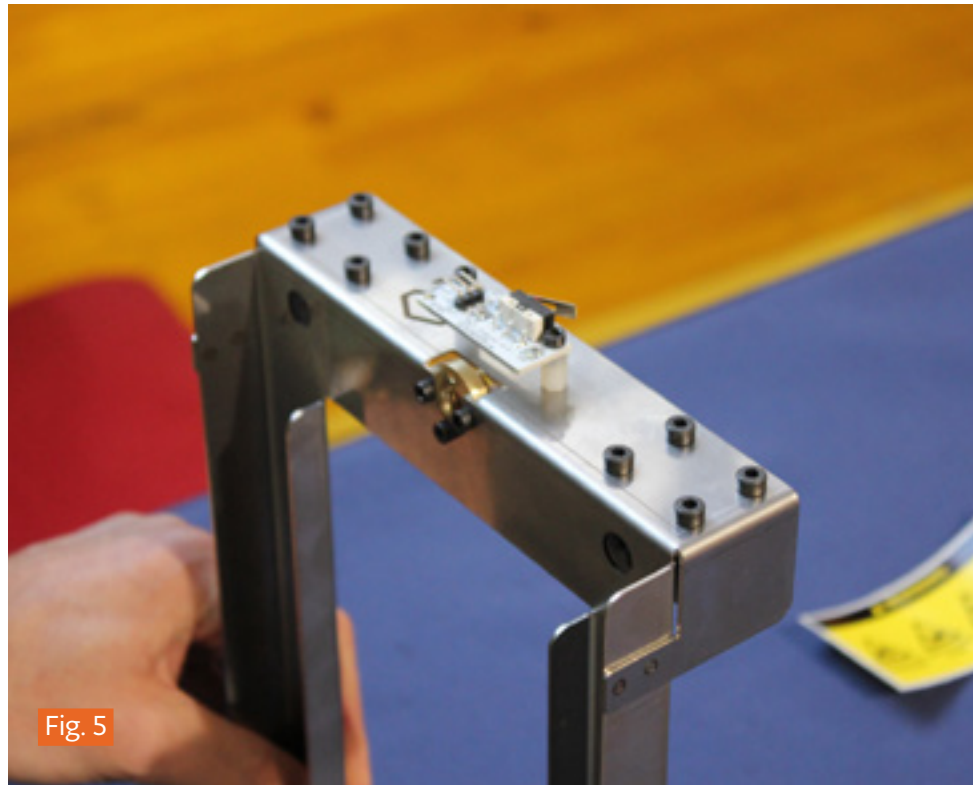


Fig. 5

Fasten the end-stop to the two nylon stand-offs using M3x6 bolts (2): the lever must be facing upwards.

Fig. 6

Attach the security sticker to the plate. The cut out must be pointed in your direction and the two tabs should face upwards.



Fig. 7- 8

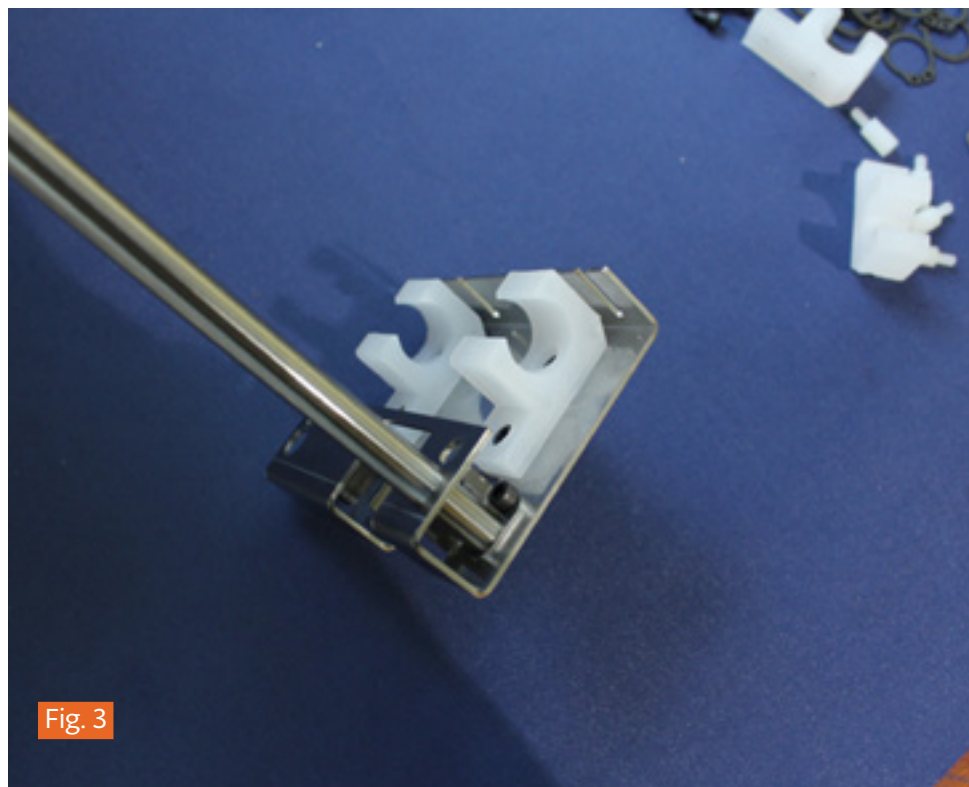
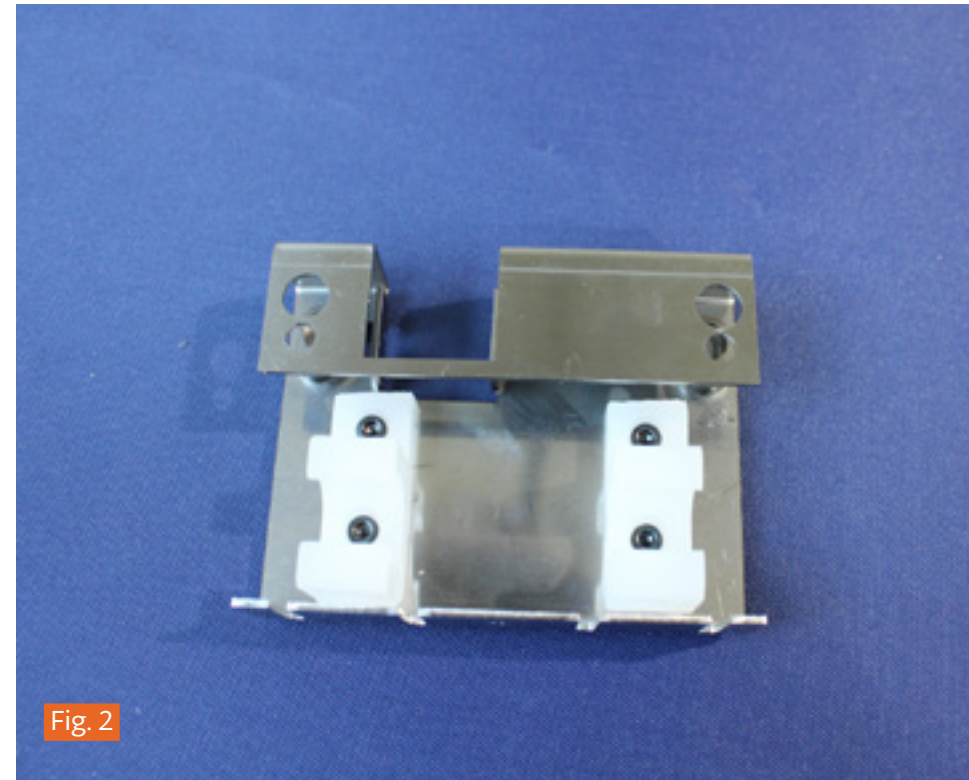
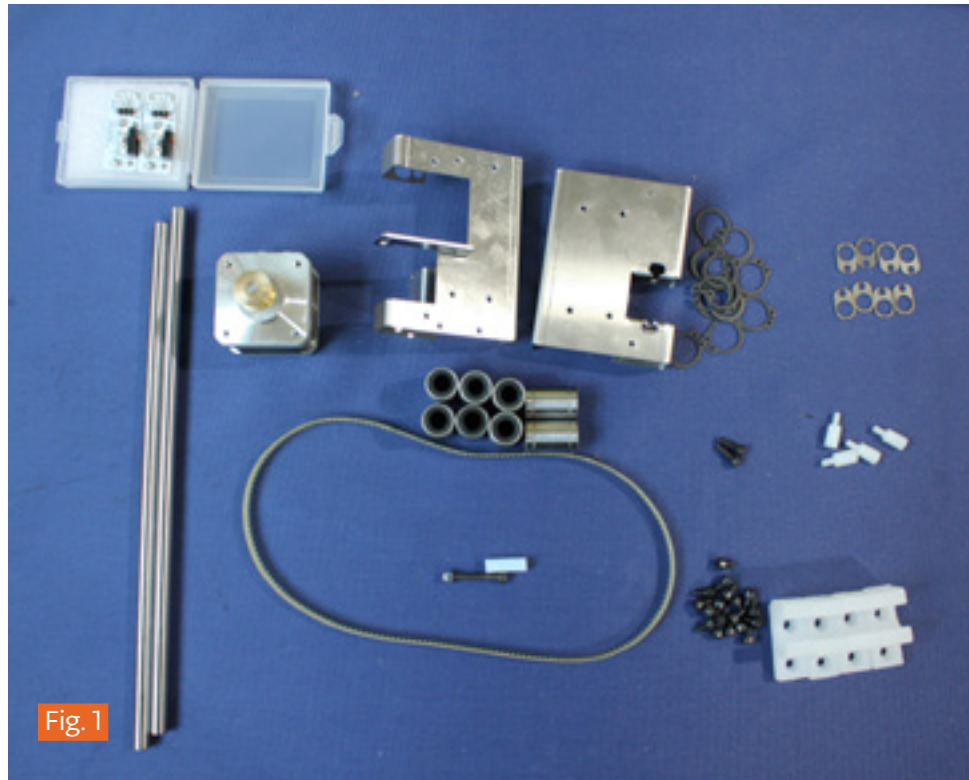
Now insert M3x25 bolts (4) into the printing bed, as pictured, then place the D10 springs on the bolts and fasten the print bed to the Z carriage. Leave the printing bed's cut out at one end of the shoulder with the Z axis bearings. You may need to use just a bit of threadlocker between the printing bed and the Z carriage.

Fig. 7

Fig. 8

05

ASSEMBLING THE CARRIAGE



ASSEMBLING THE CARRIAGE

Fig. 1

To complete this step, select these tools and parts:

- Right lateral shoulder
- Left lateral shoulder
- Stepper motor with pulley
- X axis D8x244mm guide
- LMU88 bearings (8)
- Seeger rings(12)
- Nylon bearing supports (4)
- M3x10 nylon stand-offs (2) and M3x20 nylon stand-offs (2)
- M3x6 bolts (20)
- X axis metal rod guides (8)
- T2.5 500 belt
- M3x25 bolt
- M3 lock nut
- 12mm 3x6 teflon tube
- End-stops (2)
- M3 x10 bolts (2)
- T2.5 16 pulley

Fig. 2

Take the left shoulder, fasten two nylon bearing carriers with M3x6 bolts (4). This part must be attached to the inside of the shoulder.

Fig. 3

If you need to, polish the holes of the X guide carrier with some sandpaper to ensure a good connection.

With M3x6 bolts (2) couple and secure the 4 metal rod guides. If needed, you may use a D8x315mm bar to center the metal rod guides with the shoulder hole before tightening. After this step, test if the guide is fully inserted into both metal rod guides. You can do this by pushing the second rod guide laterally with a flathead screwdriver.

This part must not move.

ASSEMBLING THE CARRIAGE



Fig. 4 - 5

Assemble the pulley pass with the M3x25 bolt and use teflon tube. Close all the parts with the lock nut.

Fig. 6

Place the pulley inside the belt. The entire part must be set inside the side shoulder. The pulley has to be oriented with the toothed side pointed towards the machine's bottom, as you see in the picture. It is necessary to use a bit of strength.

Fig. 7

Insert the D8 guides (2) into their sites.

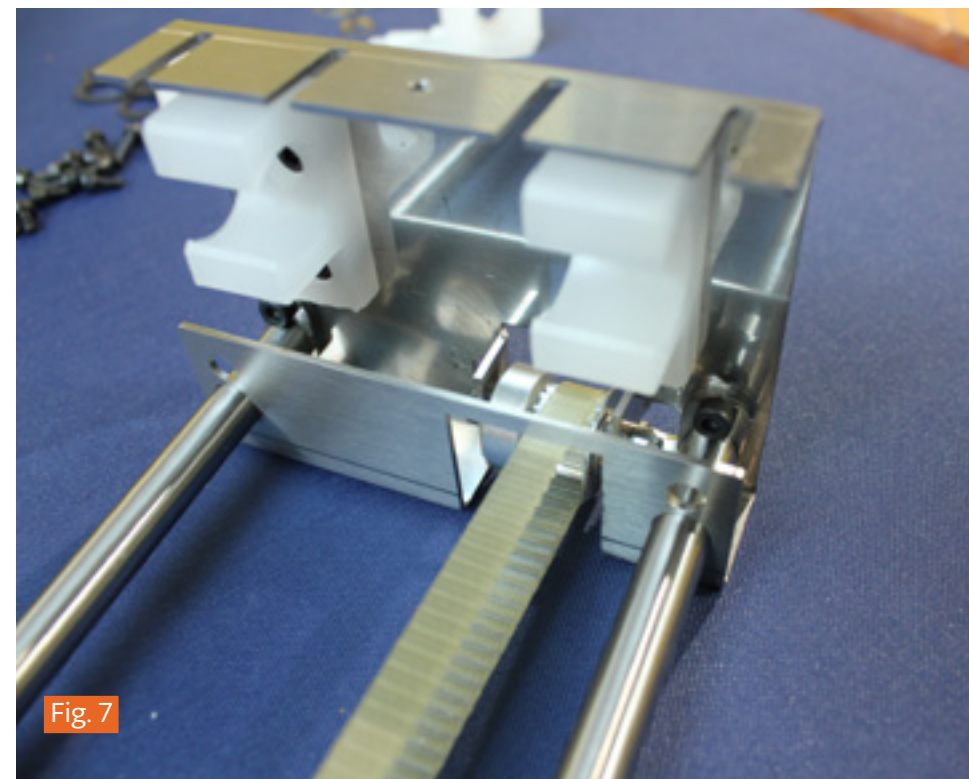
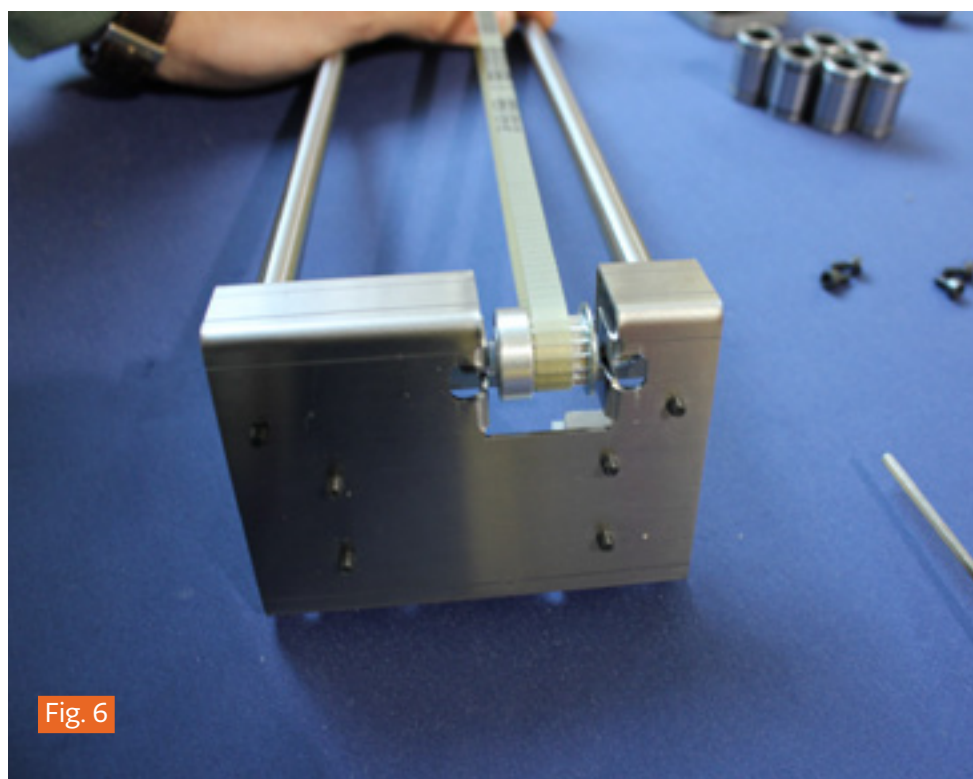
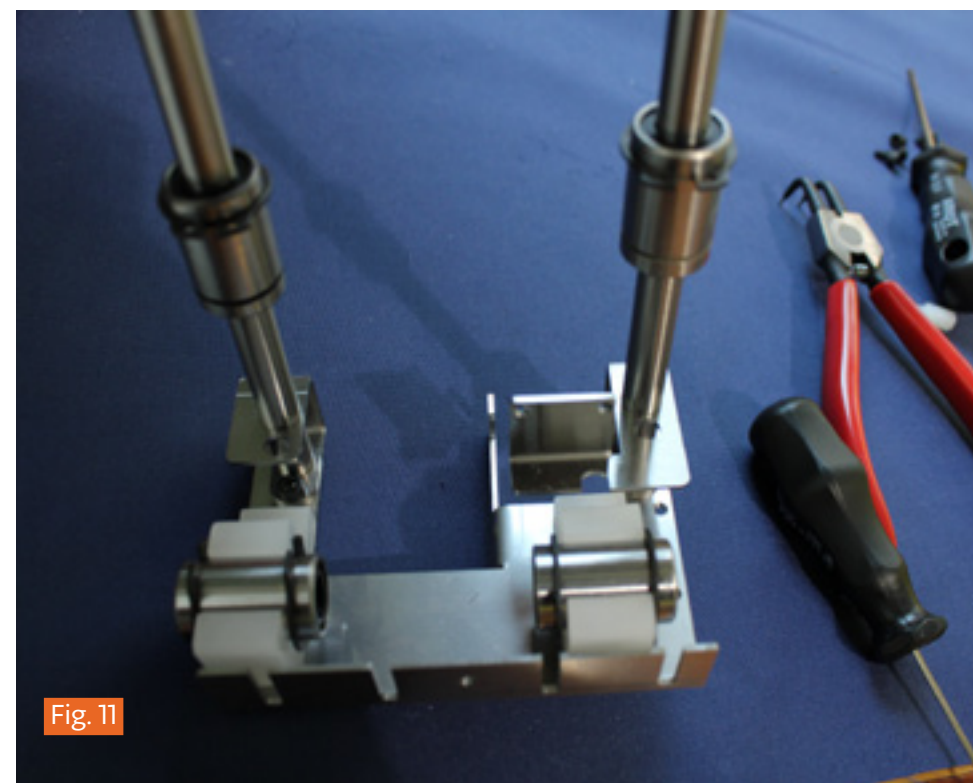
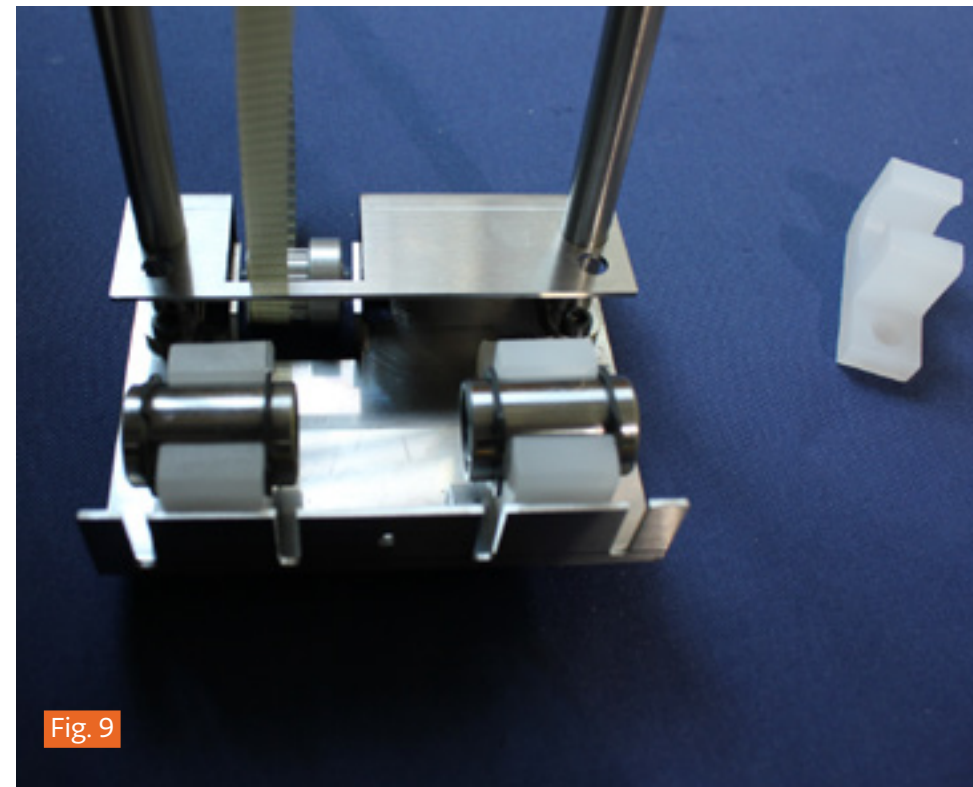


Fig. 4

Fig. 6

Fig. 5

Fig. 7



ASSEMBLING THE CARRIAGE

Fig. 8

Take LM8UU bearings (2), then using Seeger pliers, assemble Seeger rings (2) for each bearing.

Fig. 9

Assemble the bearing, wedging in the nylon bearing carrier that we assembled before on the left shoulder.

with M3x6 bolts (4), as you did with the left one (fig. 3). Fasten the metal rod guides (4) with M3x6 (2) bolts inside the threaded holes (fig. 3). Repeating the same process you did for the left shoulder. For this one, also use the LM8UU bearings (2) with attached Seegers.

Fig. 10

Now assemble a Seeger ring for each of four LM8UU bearings. To do this use a Seeger pliers.

Attach the LM8UU bearings (4) with only one Seeger on the X bars with 2 bearings to each bar. The Seeger ring must be internally aligned.

Fig. 11

It is time to assemble the right shoulder. Take the shoulder and secure two nylon bearing carriers

ASSEMBLING THE CARRIAGE

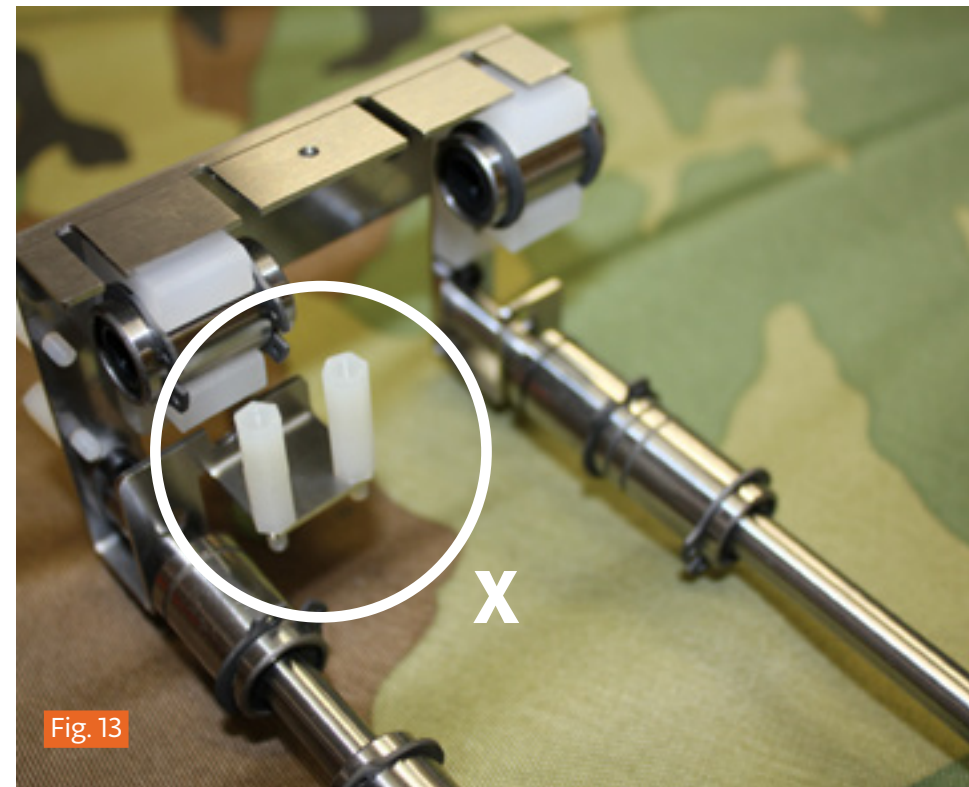


Fig. 12 - 13

Tighten M3x10 nylon stand-offs (2) in their holes to build the Y end-stop, as in the pictures. Repeat the same process to build the X end-stop with the M3x20 stand-offs (2).

Fig. 14

The two Seegers' openings must be parallel to the guides (as in the picture). Tighten the X end-stop using M3x6 bolts (2) to the M3x20 nylon stand-offs (2), making them pass through the two Seegers we talked before.



Fig. 15

Secure the Y end-stop with M3x6 bolts (2).



ASSEMBLING THE CARRIAGE

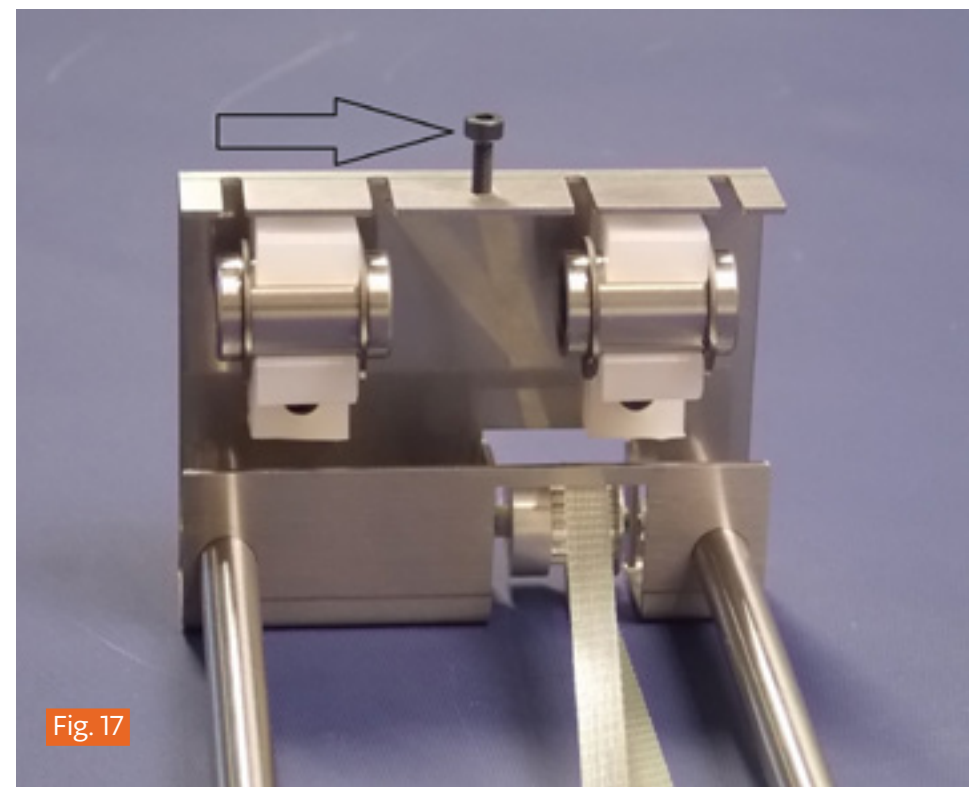
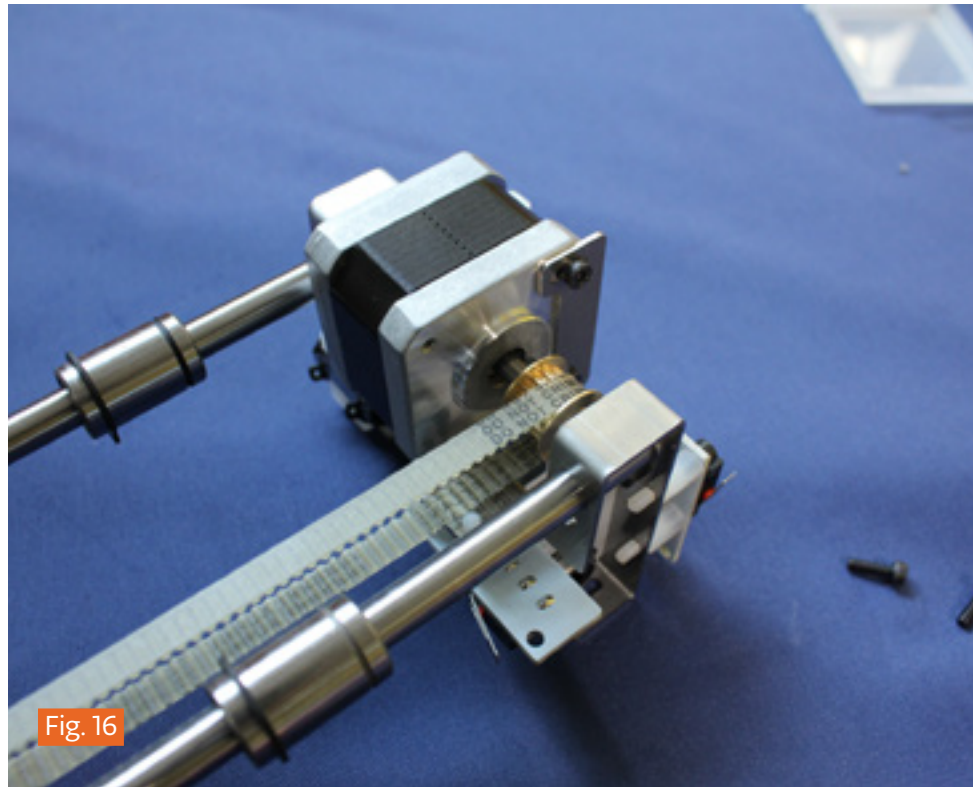


Fig. 16

Insert the X guide rods in the right shoulder. Take the stepper motor, with the integrated pulley pointing to the outside of the connector's plug (to the right), and pass the belt through and onto the pulley. Then place M3x6 bolts (2) through the securing loops and then inside the motor's holes.

Fig. 17

Fig. 17 - 18

Without tightening, place M3x10 bolts (2) into the threaded holes on the carriage's top part.

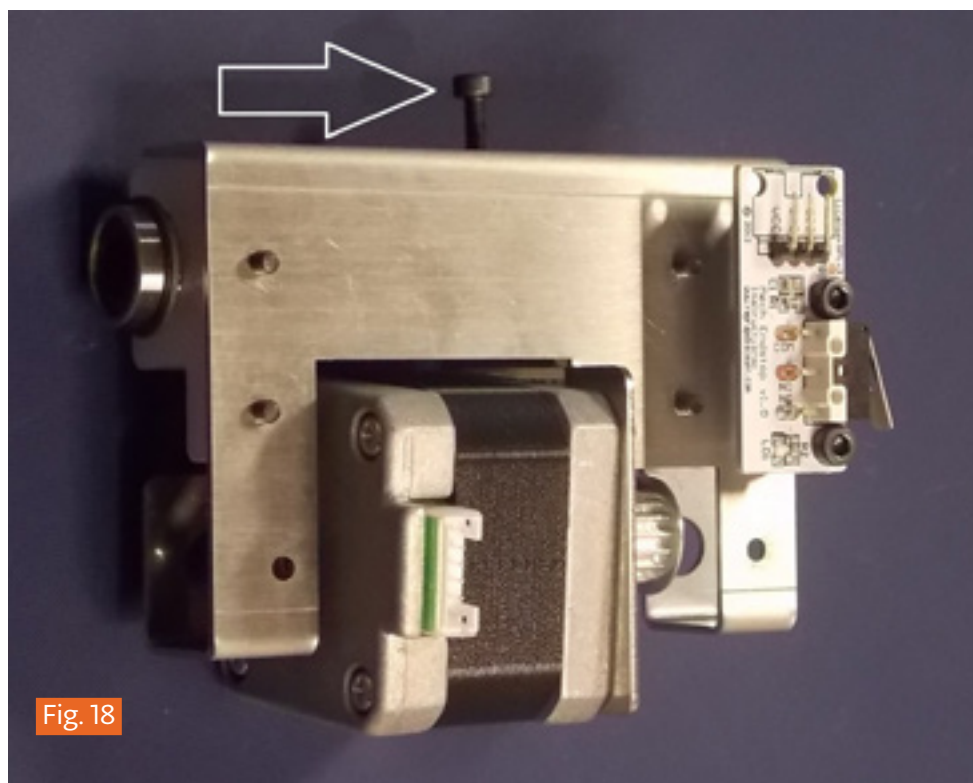
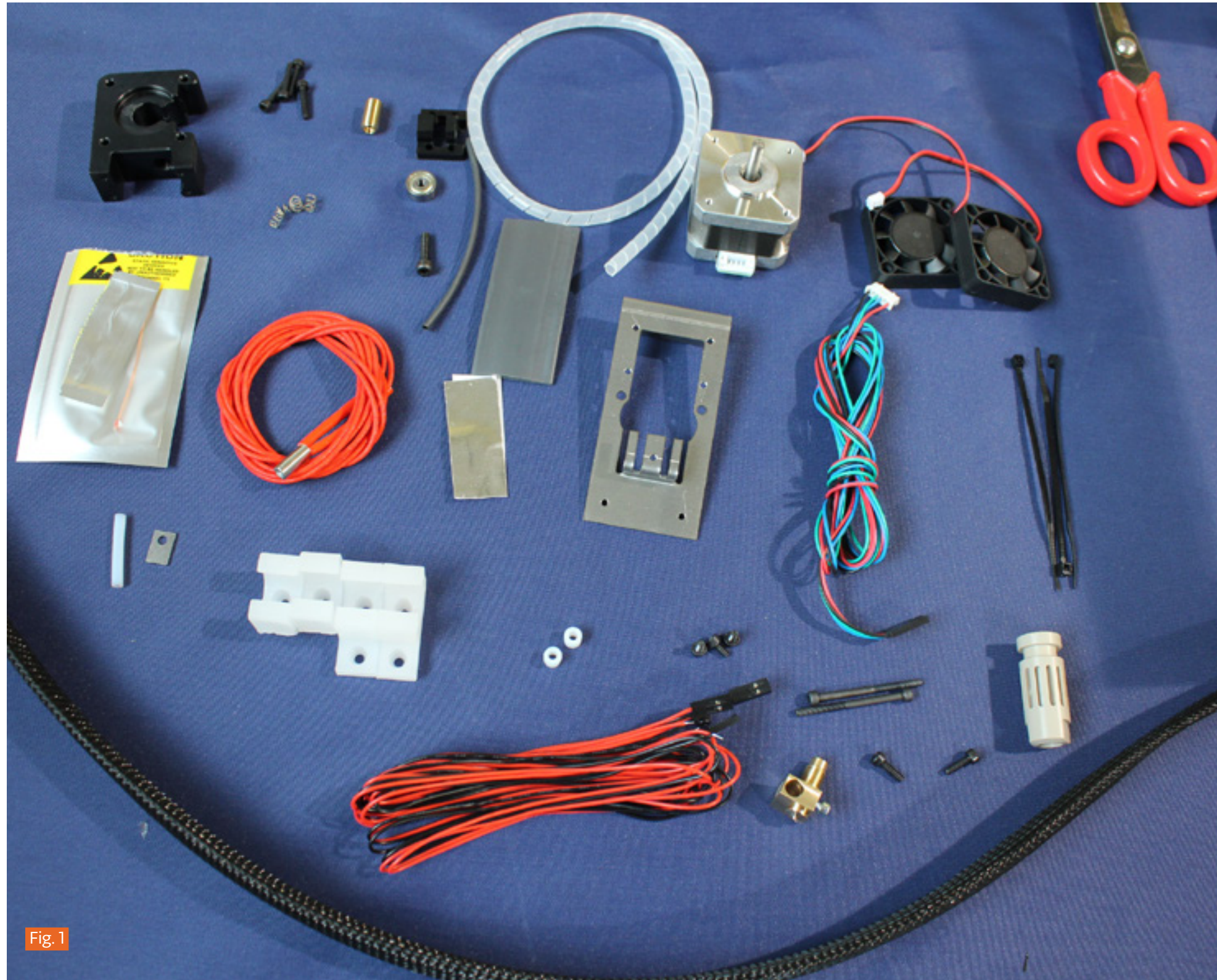


Fig. 18

06

ASSEMBLING X CARRIAGE AND
THE EXTRUDER

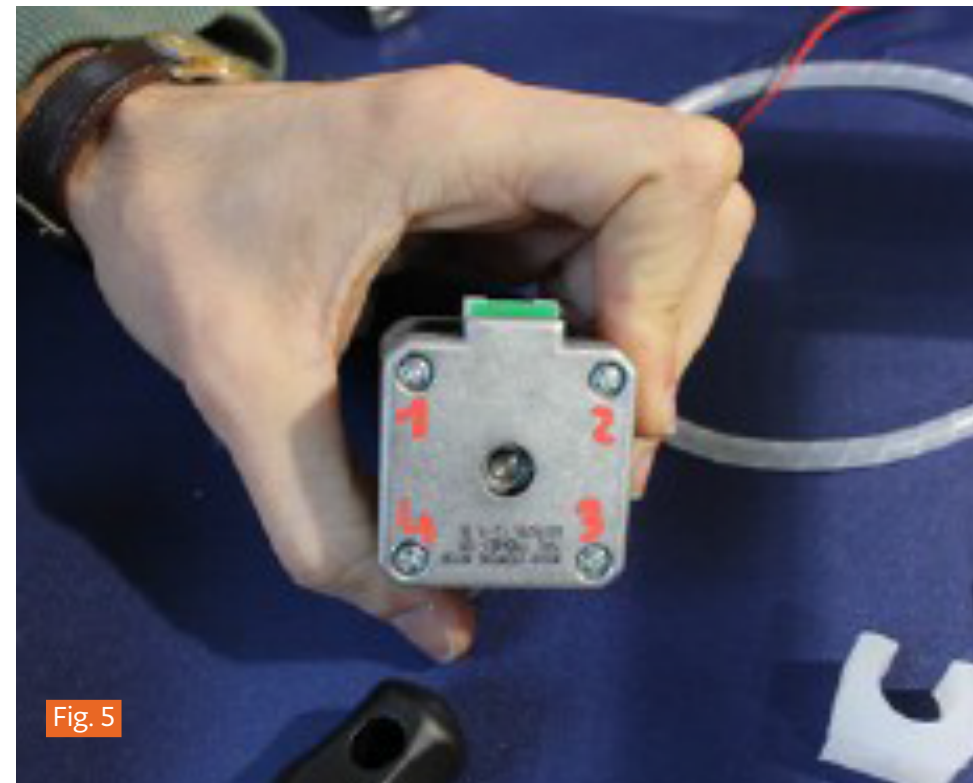


ASSEMBLING X CARRIAGE AND THE EXTRUDER

Fig. 1

To complete this step you will need:

- X carriage
- Nylon bearing carriers (4)
- M3x6 bolts (4)
- 5mm stand-offs (2)
- M3x40 bolts (2)
- Pre-assembled hot-end
- 40x40 fans (2)
- Stepper motor
- Grey cable (extruder carriage)
- PVC extruder block
- PVC bearing carrier block
- M4x16 bolt
- 624zz bearing
- D5 springs (4)
- M3x18 bolts (4)
- Cable ties
- M3x10 bolts (4)
- Brass gear wheel
- M3 grub screw
- M3x25 bolts (4)



ASSEMBLING X CARRIAGE AND THE EXTRUDER

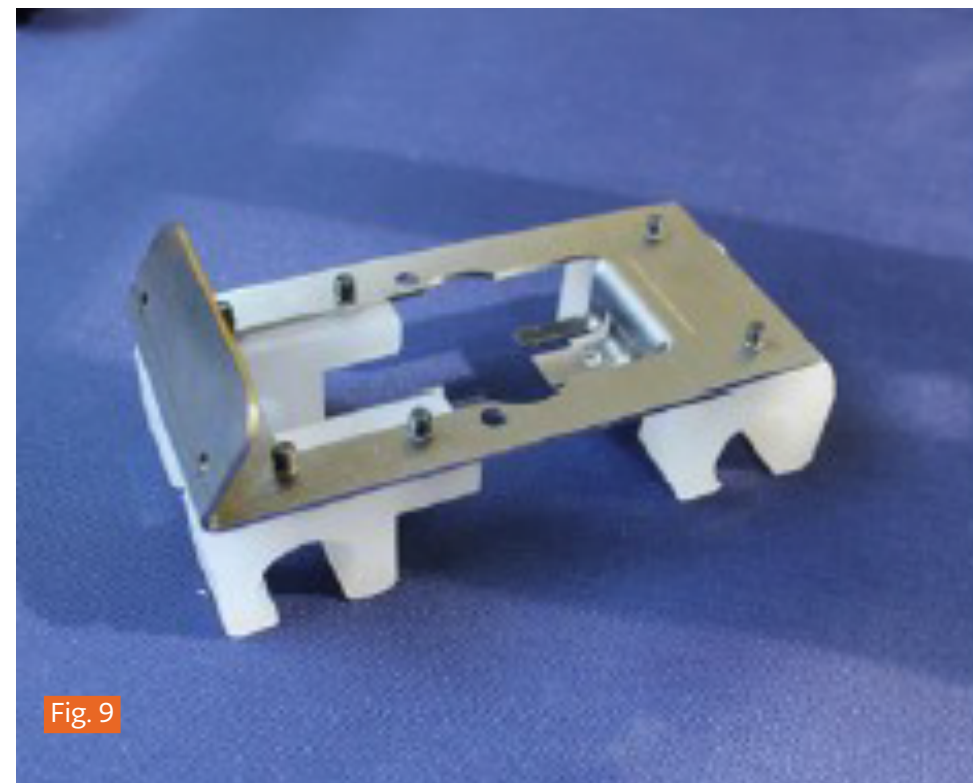
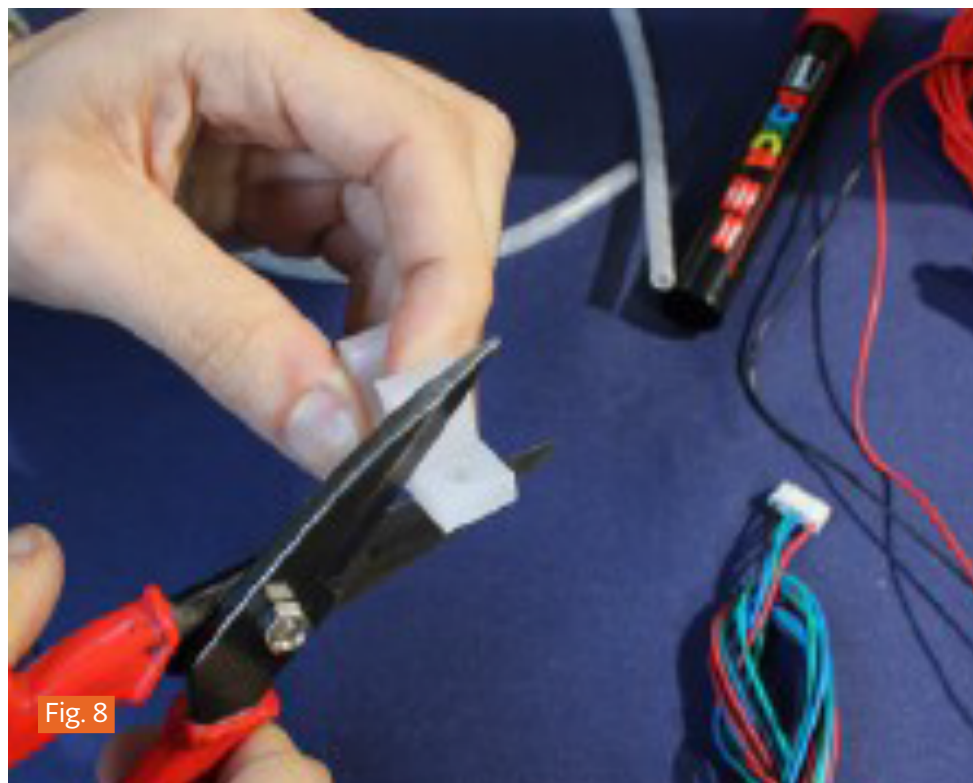
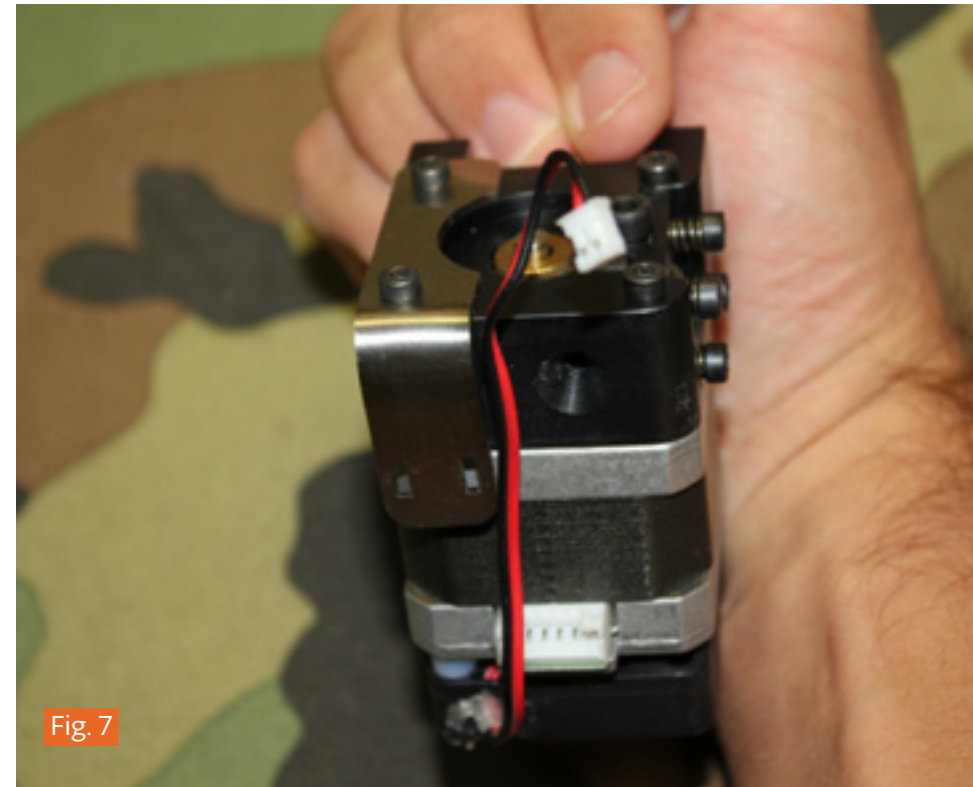
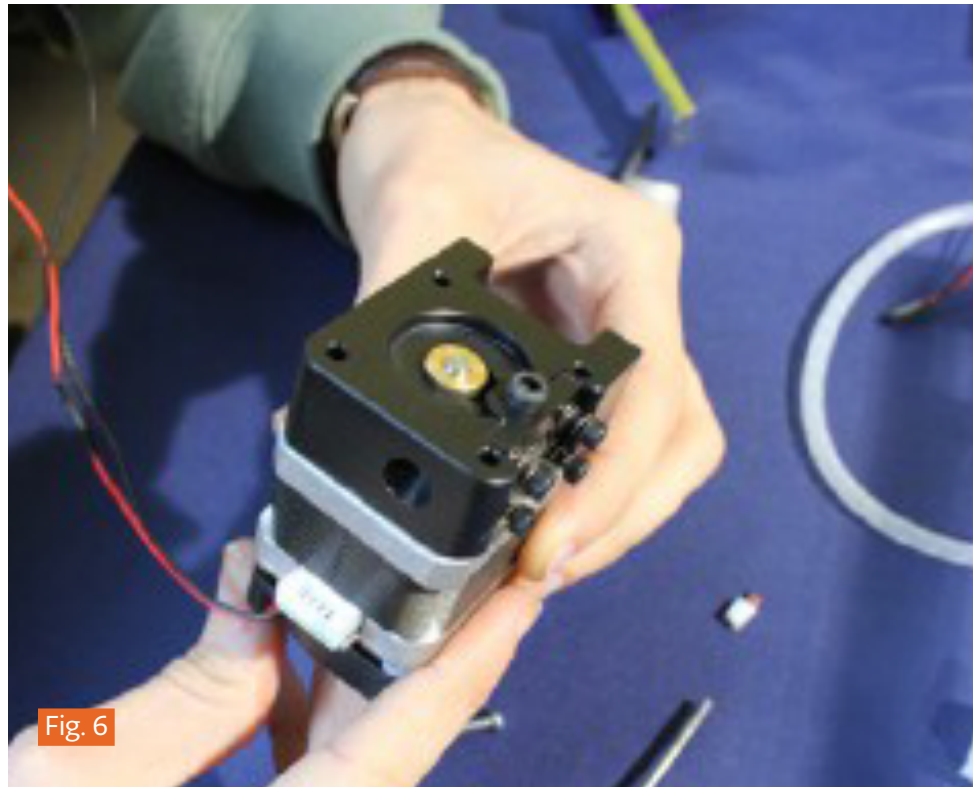
Fig. 2
Build the extruder idler. Take the small black PVC part and assemble the 624ZZ bearing inside it, blocking it with a M4x14 bolt.

Fig. 3
Now join the extruder idler to the pushing body. You will need M3X16 bolts (4) and D5 springs (4): insert the bolts inside the springs, then each spring + bolt should be inserted into the bearing carrier block. Assemble the extruder idler onto the extruder block leaving the grooved side on the motor side. Looking at the block, the bearing should be on the left (that is the motor side). In the picture we marketed it with a M.

screw, paying attention that the M3 grub screw is on the flat side of the motor shaft. Attention: the M3 grub screw must not be aligned with the bearing, because it will cause problems during the dragging of the filament.

Fig. 5
Unscrew screws no. 2 and 4 of the stepper motor with a crosshead screwdriver. Then tighten the 40mm fan to the motor's back, as in the picture. Mark the connector so that you will recognize it while wiring.

Fig. 4
Assemble the drive gear onto the stepper motor. Screw the M3 grub



ASSEMBLING X CARRIAGE AND THE EXTRUDER

Fig. 6

Take the M3x40 bolts. Align the fan with the stepper motor and then the connector with the cable on the same side. Fasten the fan with the screw then repeat the same operation with the 5mm stand-offs and screw the fan on the stepper motor's back, as in the picture.

Fig. 8

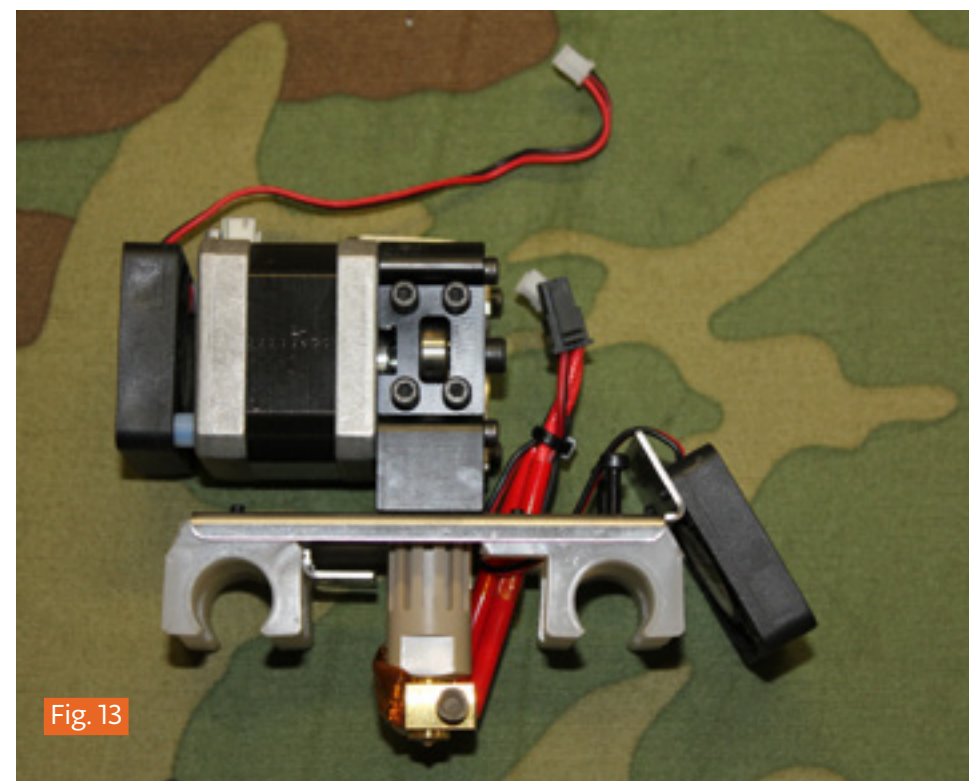
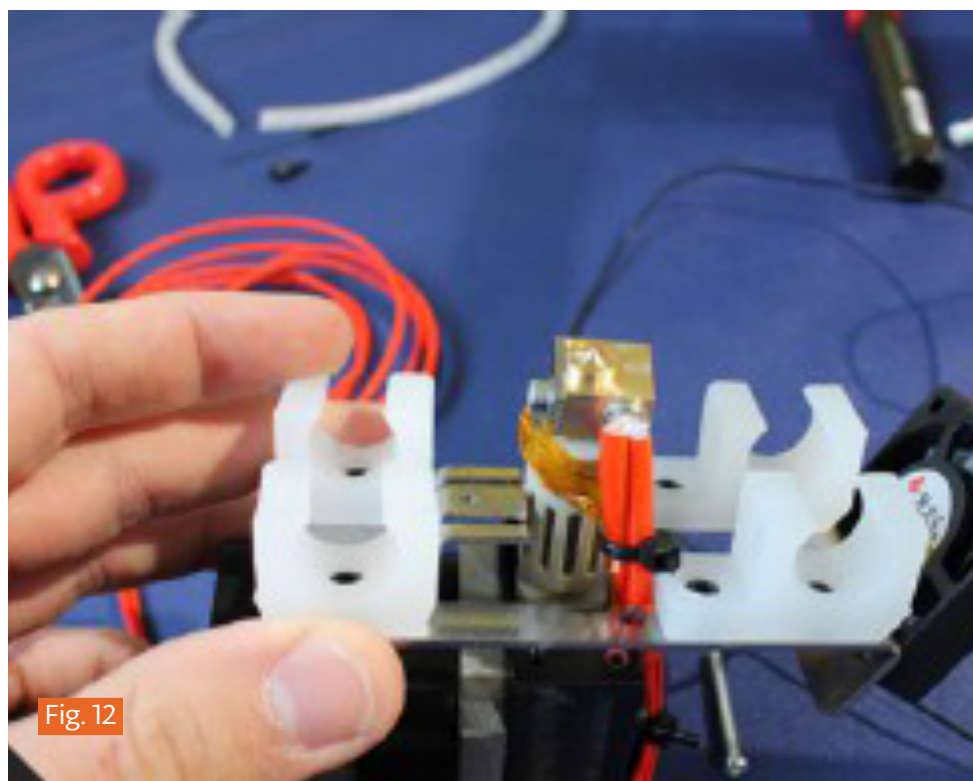
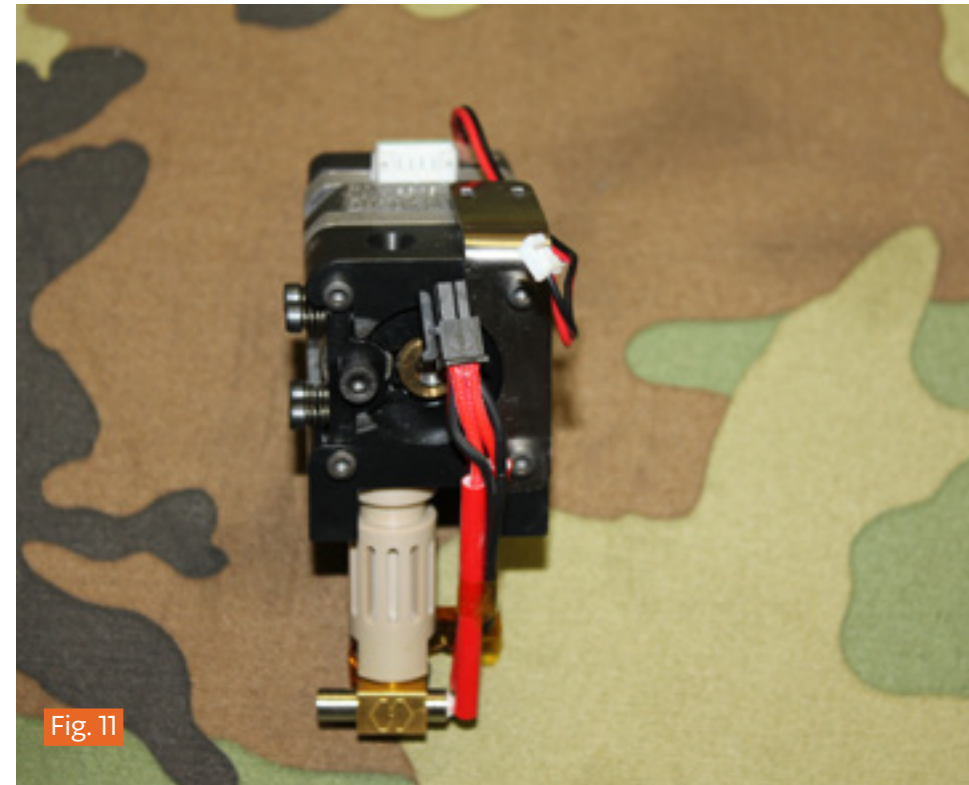
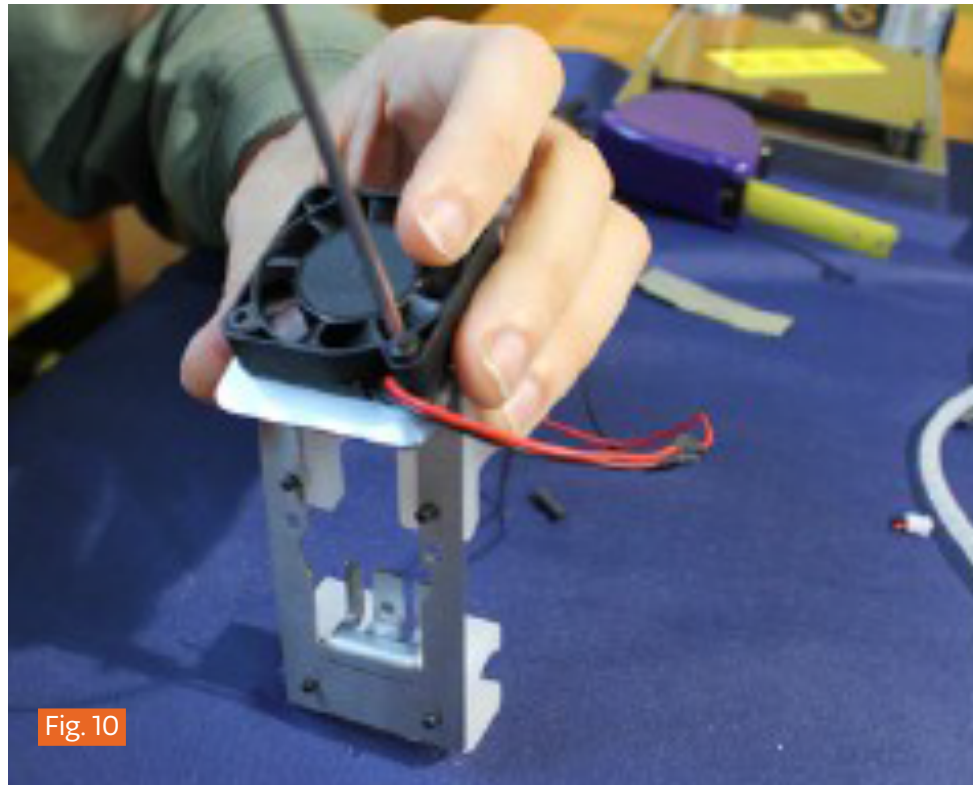
You should have saved 4 nylon bearing supports. Cut away the extra with scissors from two of those four as seen in the picture.

Fig. 9

Tighten the nylon bearing carrier with M3x6 bolts (4) onto the carriage. This part must be positioned on the back of the carriage leaving the cut part on the inner side.

Fig. 7

Now attach the extruder block to the stepper motor, which helps keep the connector facing upward, with M3x25 bolts (4). Make sure to leave the springs on the left side. Place the wiring support plate on the right. The extruder block orientation is crucial; before proceeding further please make sure it is correct as in the photo. The bearing adjustment screws should be on the left. Once mounted this part should be accessible when it is in "home" position.



ASSEMBLING X CARRIAGE AND THE EXTRUDER

Fig. 10

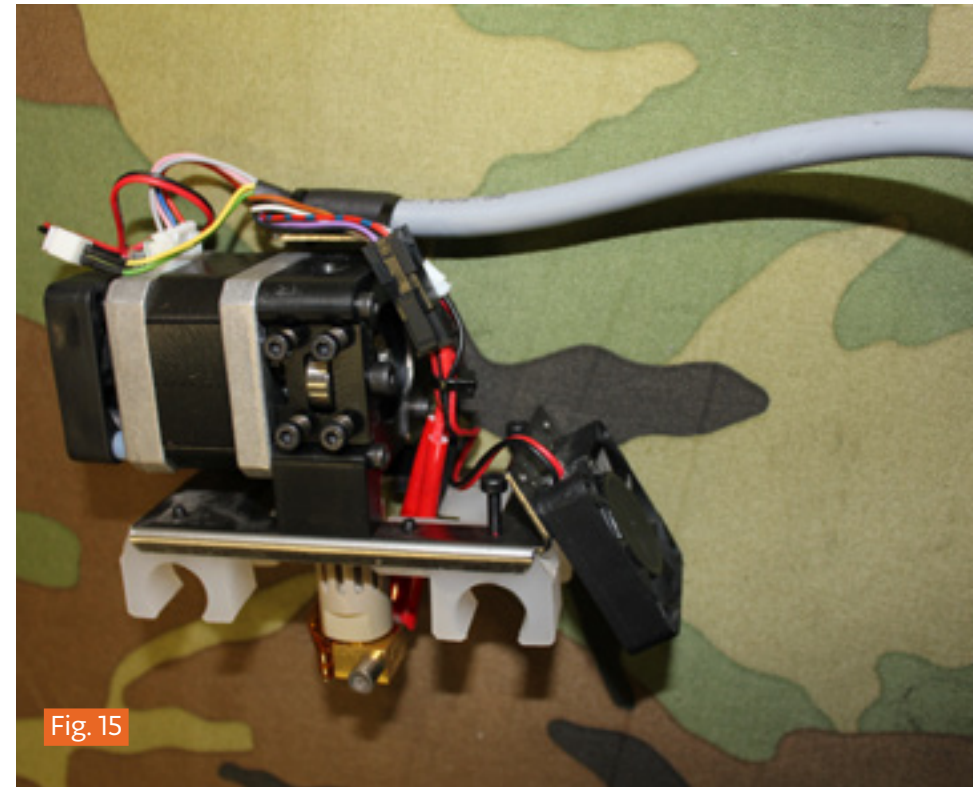
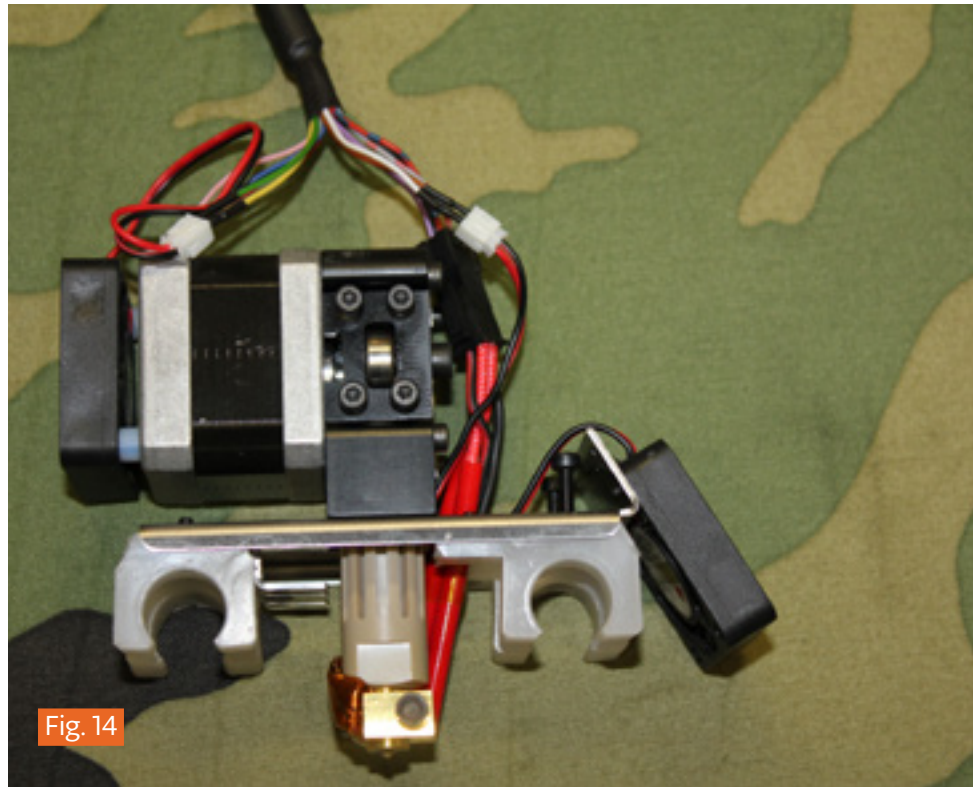
Fasten the 40mm fan to the carriage front with the wiring oriented to the top. Use M3x10 bolts (2) to do this.

Fig. 11

Screw the assembled stepper block to the extruder using the threaded brass joint. Join this part with the PVC part. The hot-end wiring must stay on the block front as in the picture.

Fig. 12

It is time to secure the assembled extruding block on to the plate with M3x10 bolts (2), the threaded holes are marked in red (see the picture).



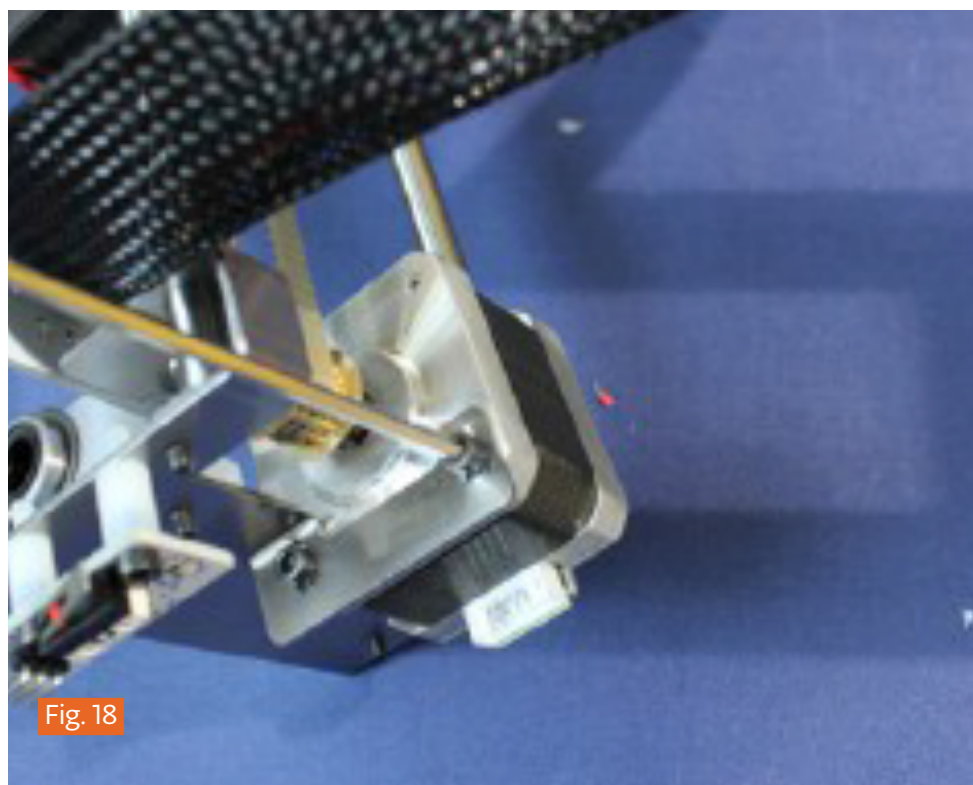
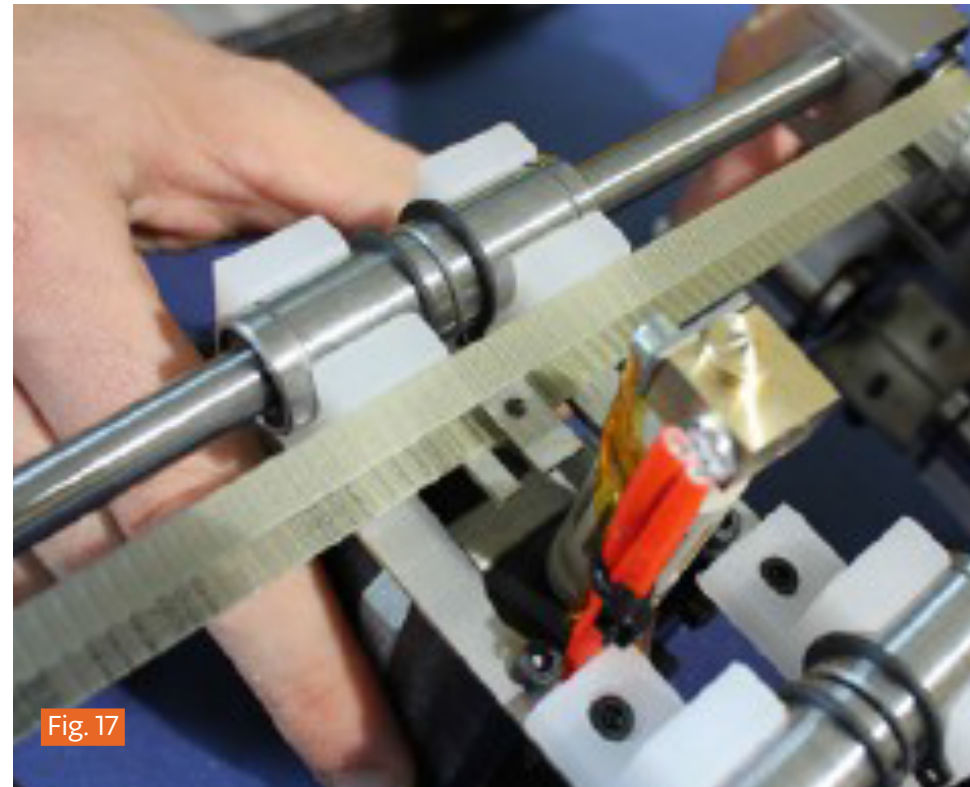
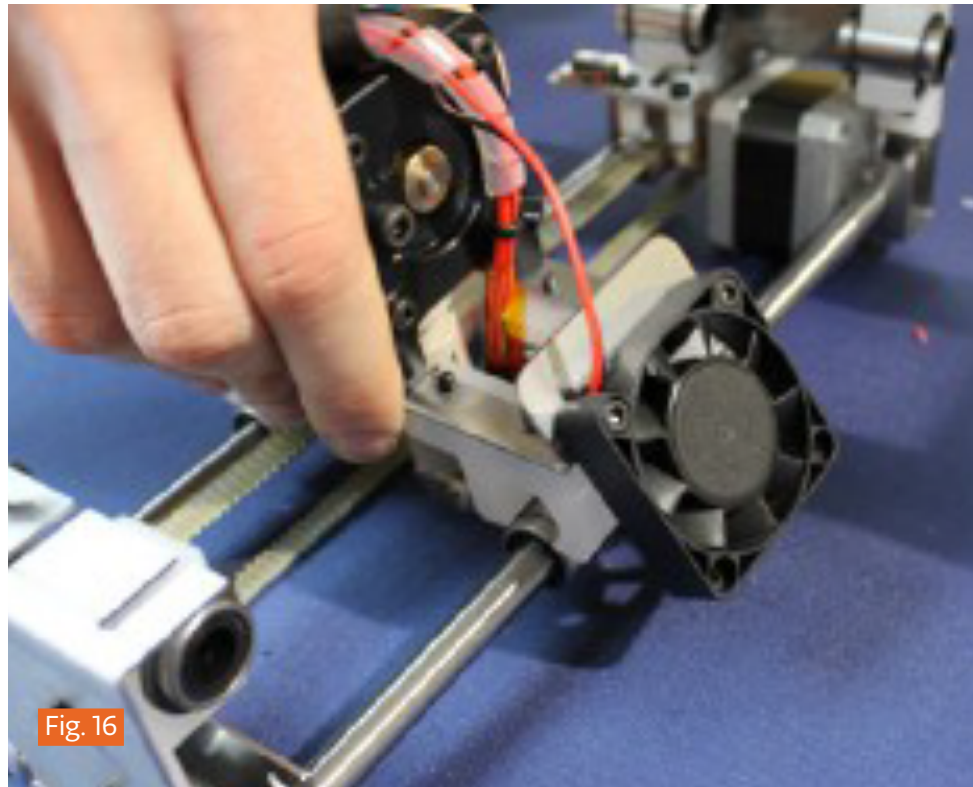
ASSEMBLING X CARRIAGE AND THE EXTRUDER

Fig. 13 - 14

To wire the extruder head, connect the large white connector to the stepper motor and the black one to the hot-end. The last two connectors are to the fan: the one with the yellow-green cables is related to the stepper cooling fan and the one with the white-brown cable should be connected to the material cooling fan (located on the carriage front).

Fig. 15

Fix the wiring by cable tying the material fan cable to the hot-end wiring. Now secure the grey cable to the bent steel plate using two cable ties: it is important that one of the two cable ties (maximum tightened) is gripping on to the cable grey.



ASSEMBLING X CARRIAGE AND THE EXTRUDER

Fig. 16 - 17 - 18

You can hook the X carriage with the extruder to the Y slide and link the belts as you see in the picture. You have to push first on the front nylon supports then on the back ones. Now, working on the stepper motor, we can tighten the belt and tighten the screws.

07

ASSEMBLING THE FRAME

ASSEMBLING THE FRAME

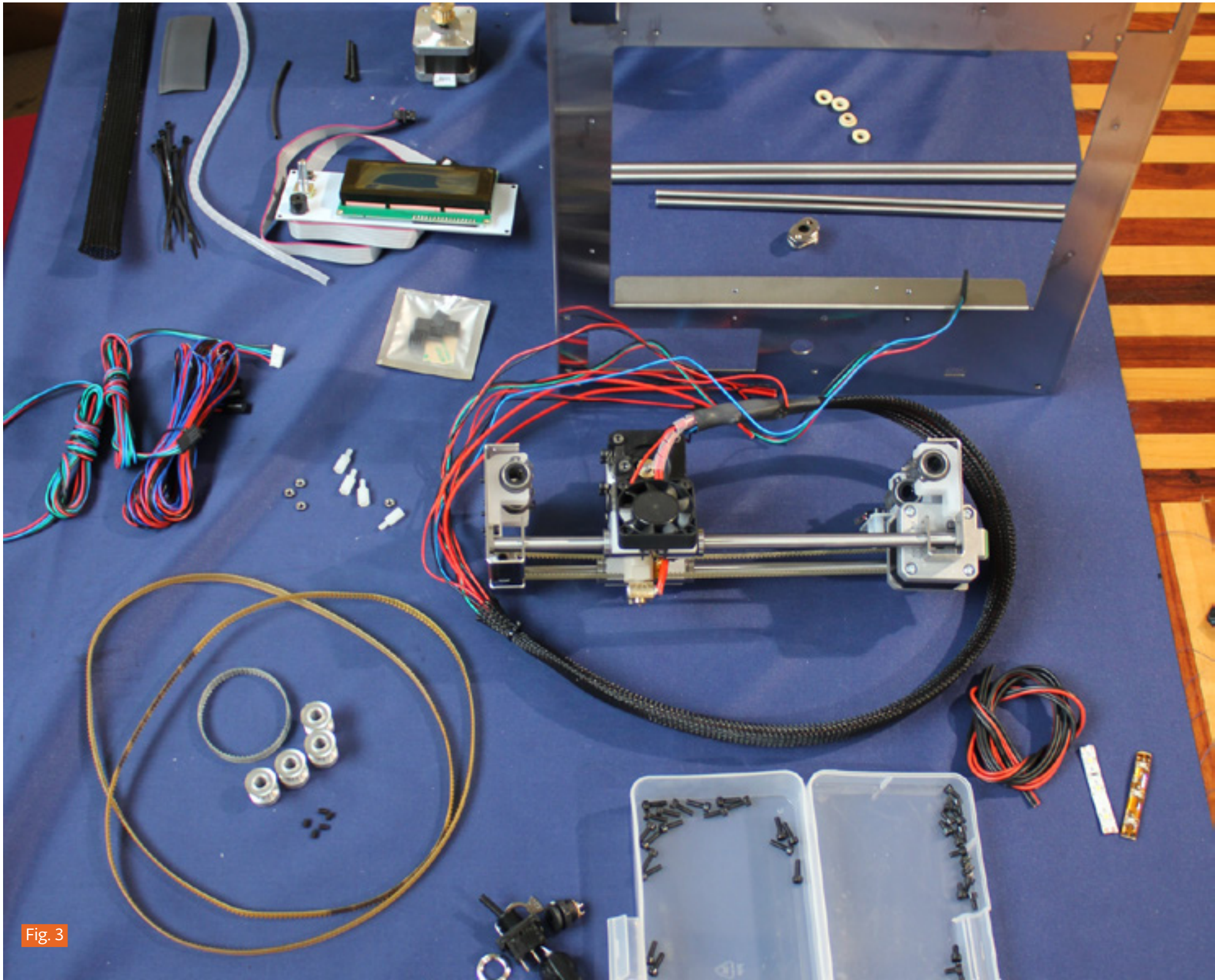


Fig. 3

Fig. 1

- Pre-assembled tray
- Pre-assembled Z carriage
- Pre-assembled XY carriage
- Y D8 315mm guides
- D6 bars (2)
- Frame
- LCD display
- M3x10 nylon stand-offs (4)
- M3 nuts (4)
- M3x6 bolts (4)
- On/off switch
- Bipolar cable
- LED
- Metal rod guides
- Y motor
- T2.5 620 belts (2)
- T2.5 160 belt
- T2.5 16 pulley
- End stop three wire cable (2)
- Motor four wire cables (2)
- X carriage grey cable
- Cable spiral

- D6 bearings (4)
- M4 Z axis adjustment screw

ASSEMBLING THE FRAME

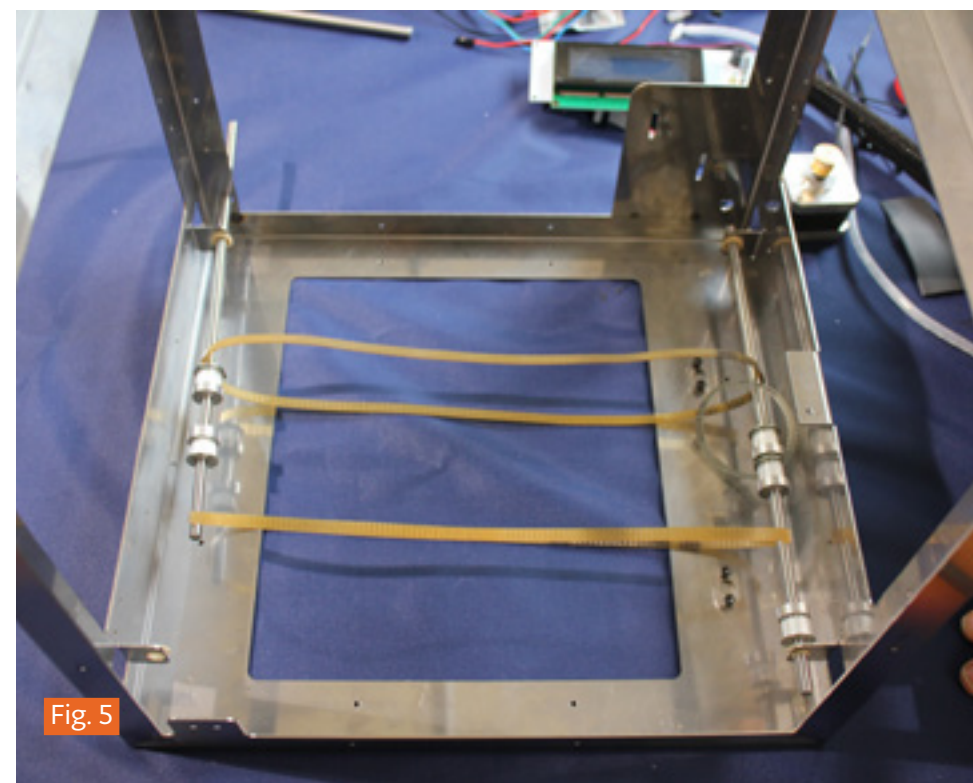
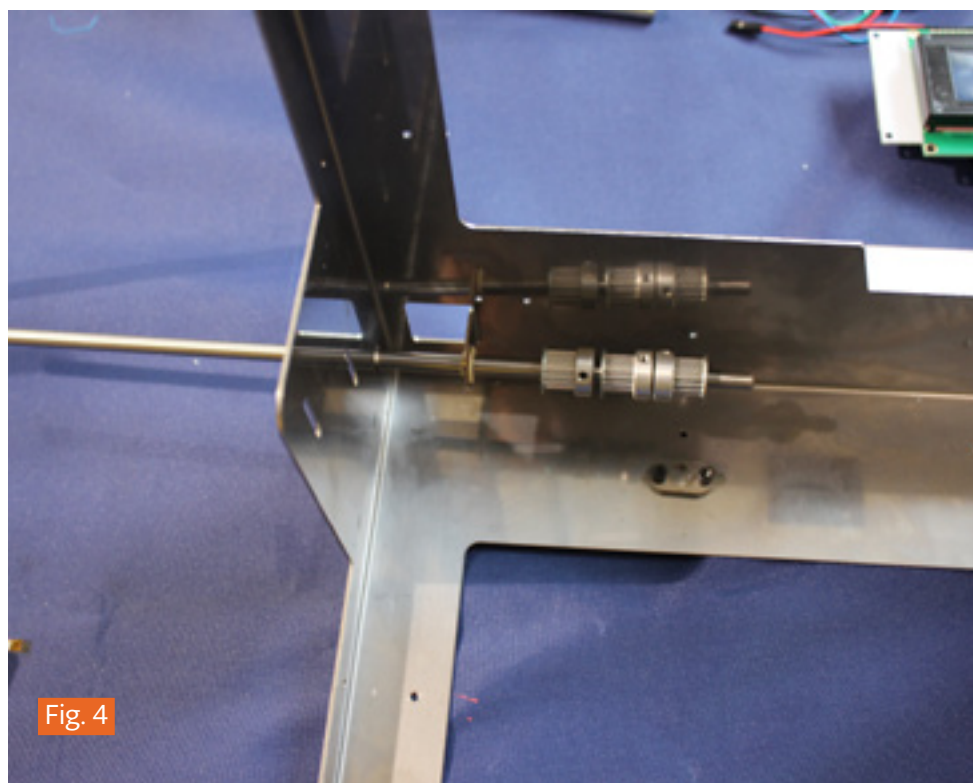
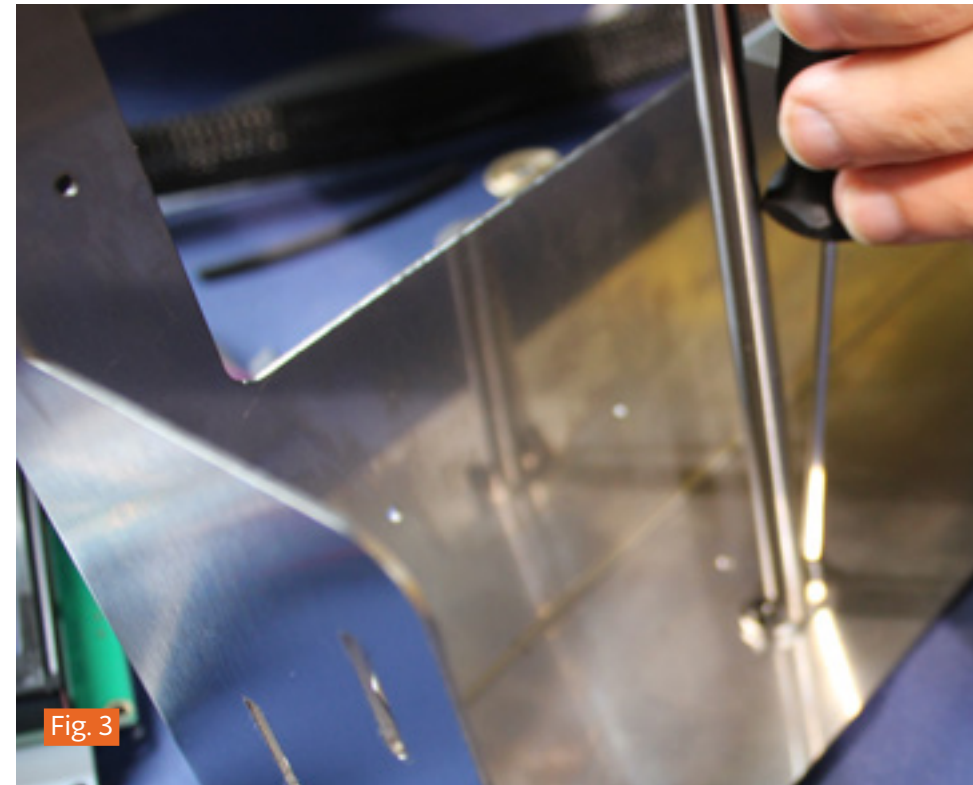


Fig. 2

Mount the frame and the D6 bearings using pressure, from inside to outside, into the holes on the inside ears to the frame, as pictured. For better assembling, just use hand pressure on the bearing and then with pliers, move the bearing inside the hole. Careful not to break the bearing.

Fig. 3

Couple the metal rod guides and fasten them on the Z axis guides holes with M3x6 bolts (2) as you did in chapter 3.

Fig. 4

Get the 6mm bars (2) and pulleys (5). Starting with the rear bar, locate the entrance hole and insert the bar until it passes just to the first yellow bearing and stick it in three pulleys according to the orientation shown in the picture. Before you slide the bar up to the second bearing, insert the

belts in this order: long, short, long, laying them on the respective pulleys. Start placing the grub screws within the pulley's threaded holes without tightening them.

Fig. 5

Move on to the D6 front bar. Locate the entrance hole and insert half of the bar. Insert the two pulleys, orienting them, as pictured, and pass the two belts inside the bar, laying them on the respective pulleys. Also here, place the M3 grub screw in the pulleys threaded holes without tightening.

ASSEMBLING THE FRAME

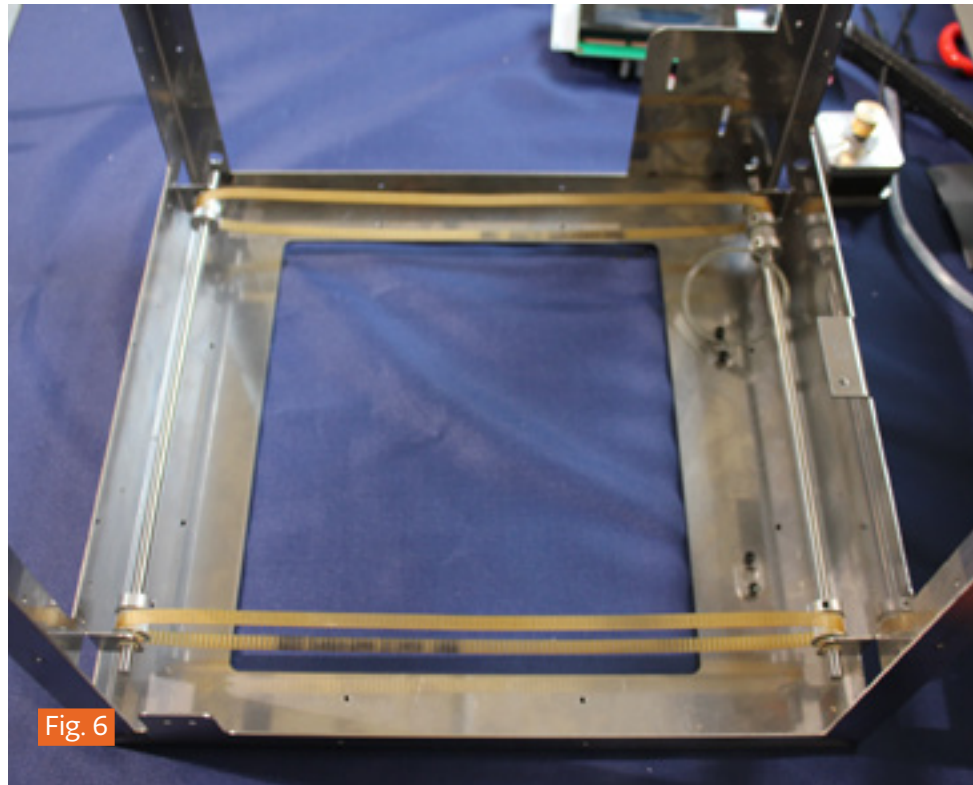


Fig. 6

Now set the pulleys, as pictured, and tighten the pulley's grub screws (you will tighten them more during calibration). You need the bars to stay in their site without moving.

Fig. 7 - 8

Tighten at least 1 cm of the Z axis end-stop knob. You have to use just a bit of threadlocker on all of the screw's length.

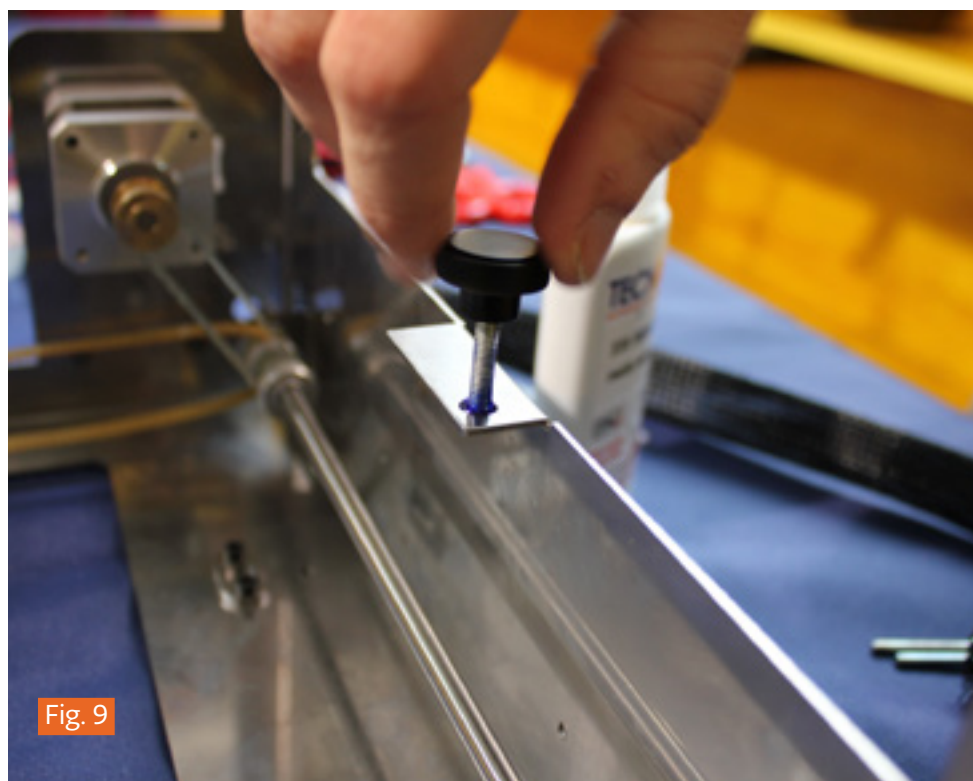


Fig. 9

Take the LCD display, M3x10 nylon stand-offs (4) and M3 nuts (4). Fasten the stand-offs onto the external display's four holes then to the LCD side (see the picture) using the M3 nuts (4).

Fig. 9

Fig. 10

ASSEMBLING THE FRAME

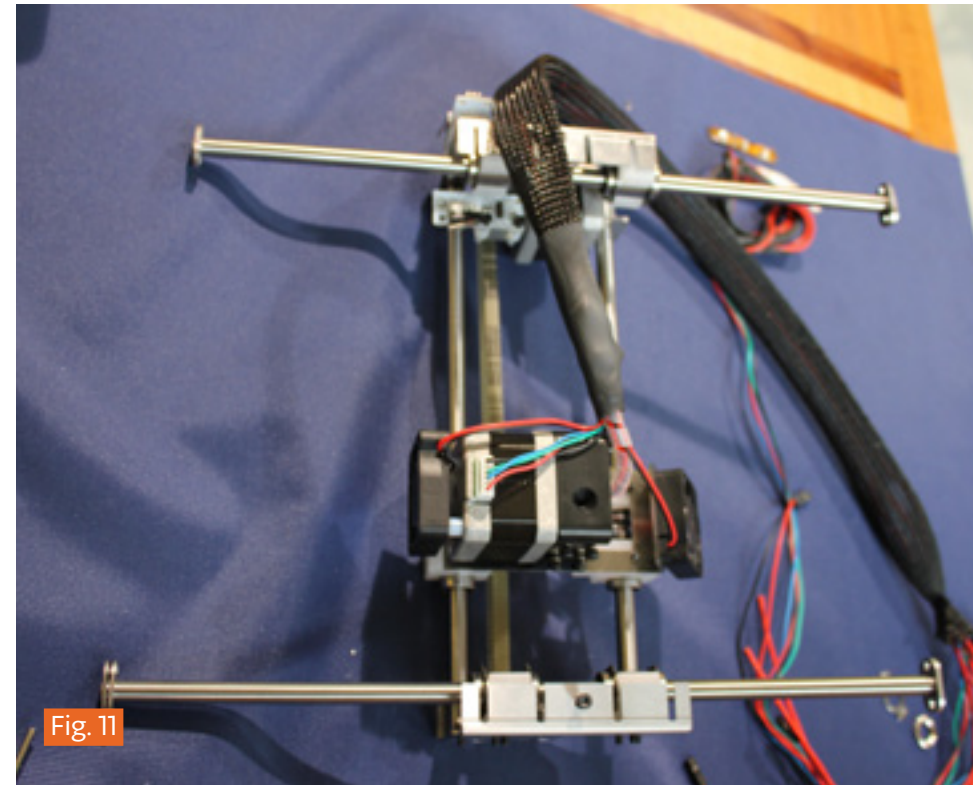
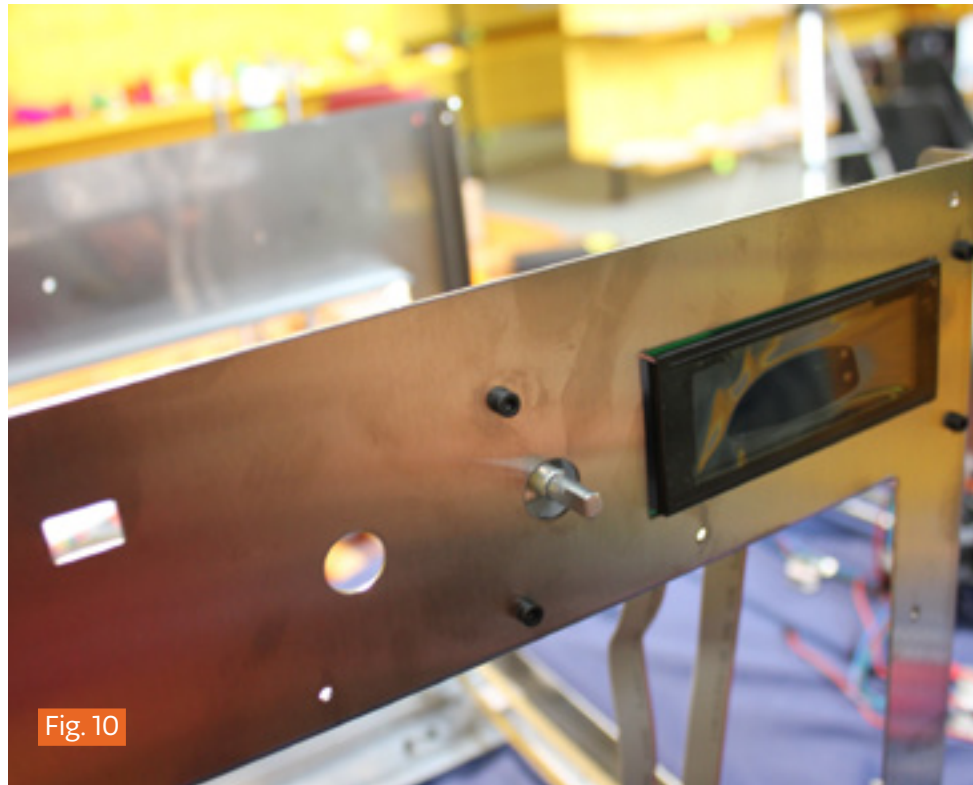


Fig. 10

With M3x6 bolts (4) assemble the LCD to the frame.

Fig. 11

Insert the Y D8 guides inside the pre-assembled carriage. Attach the metal rod guides.

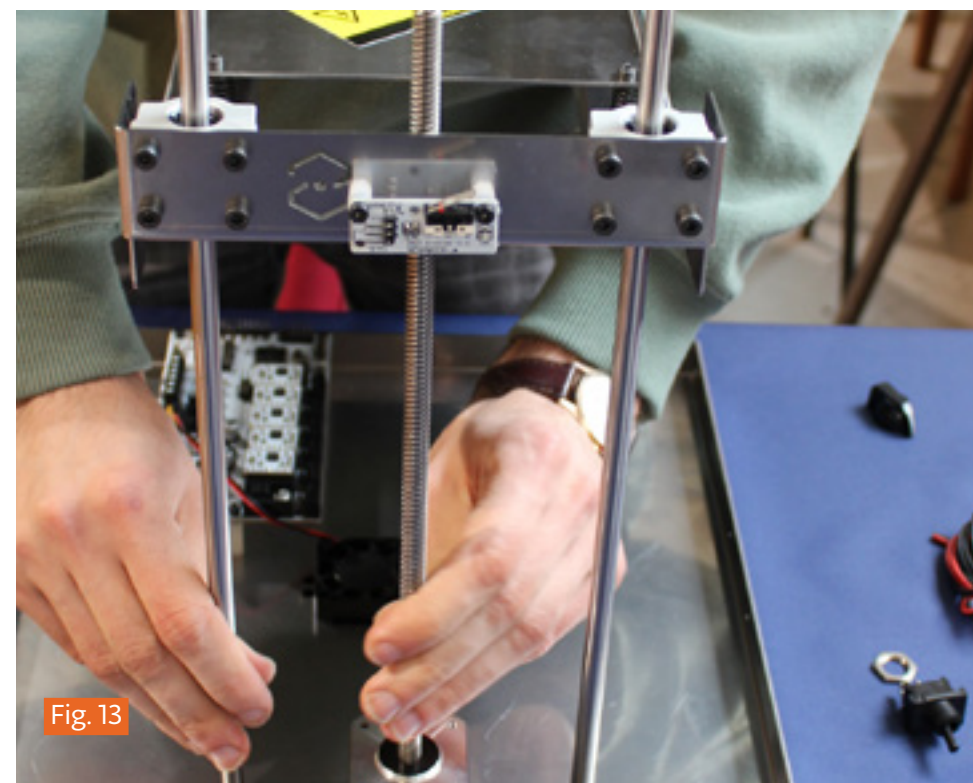
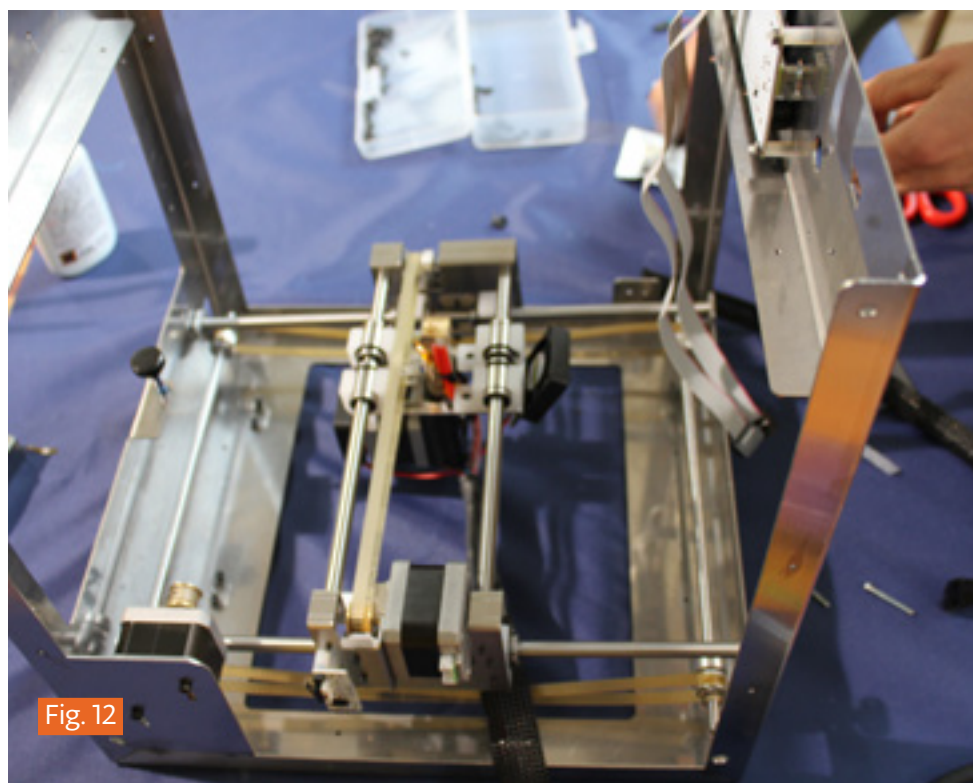


Fig. 12

The X/Y carriage must be oriented as pictured, then tighten the guide, securing points with M3x6 bolts (8).

Fig. 13

Now insert the Z carriage on making it pass through the guides and spin the lead screw until it is half way from the top.

ASSEMBLING THE FRAME

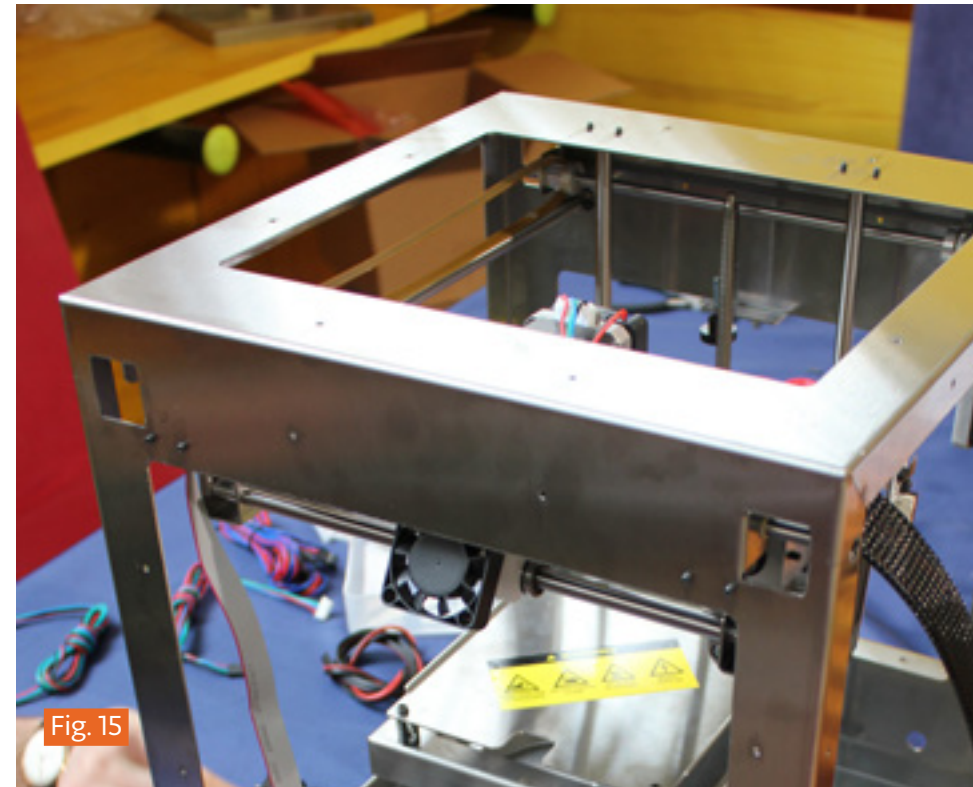


Fig. 14

Insert the pre-assembled frame on the carriage. The borders must pass outside the carriage and the Z guide must fit into the top guide carriers.

Fig. 15

Secure the frame to the carriage with M3x6 bolts (8).

to have the same distance between X and Z guides.

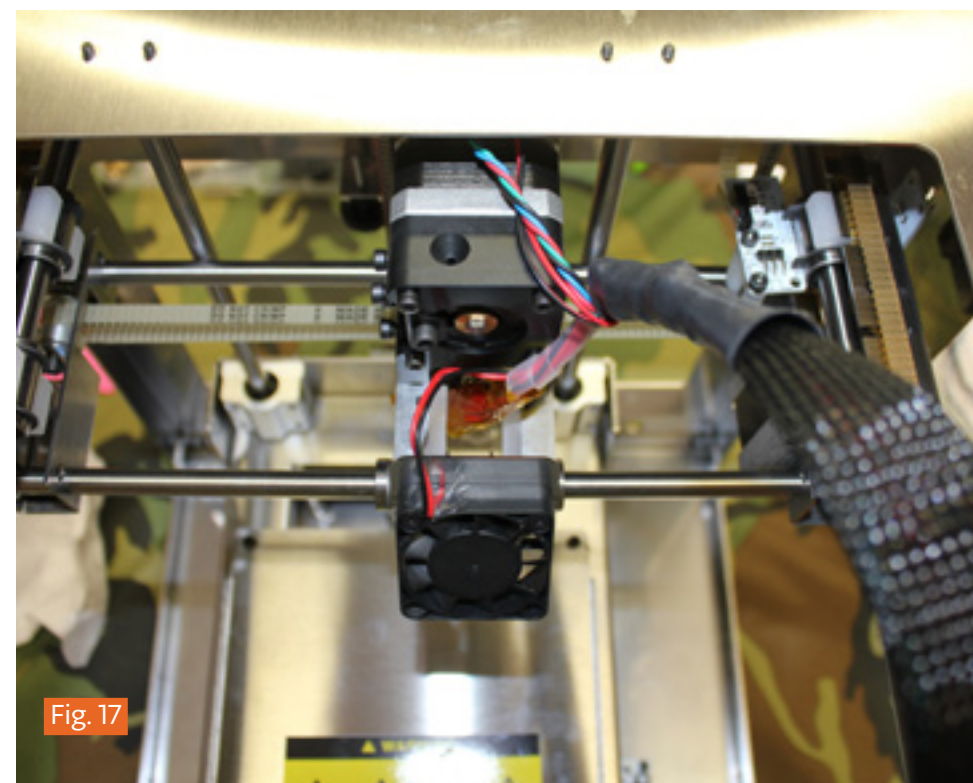
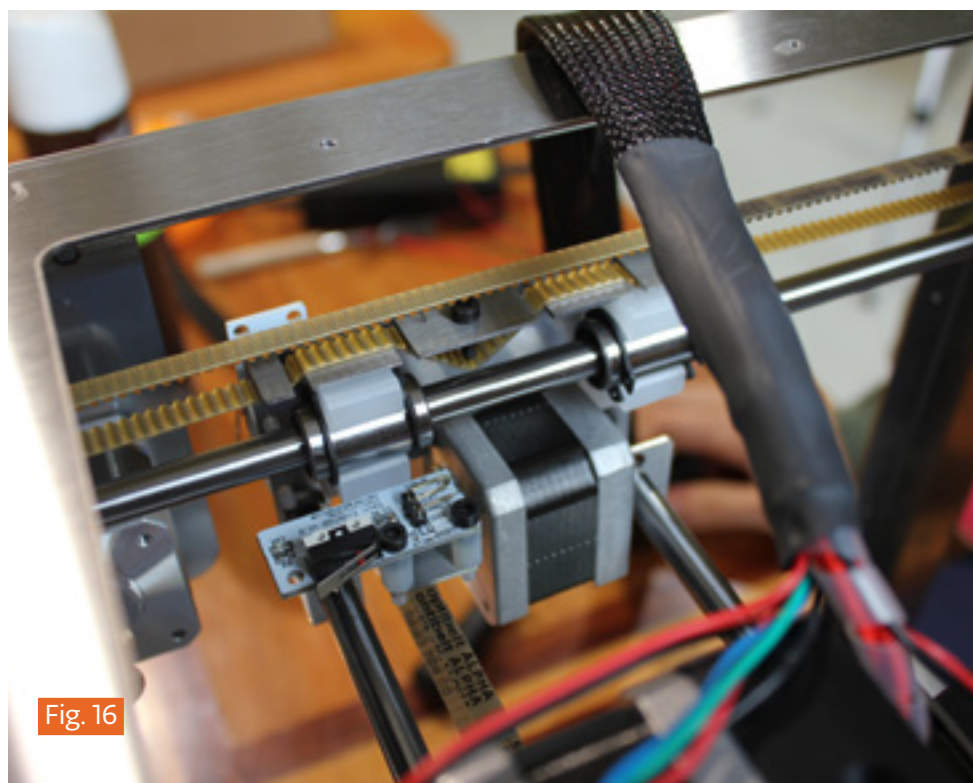


Fig. 16

Now insert the Y belts inside the shoulder (picture), screw off the pulleys' grub screws then tighten the M3x10 screw assembled at the each shoulders' center.

Fig. 17

Once you have tightened the Y belts, align the X and Z guides so they are squared then fasten the pulleys' grub screws. Having a squared carriage is crucial so it is important

Fig. 16

Fig. 17

ASSEMBLING THE FRAME

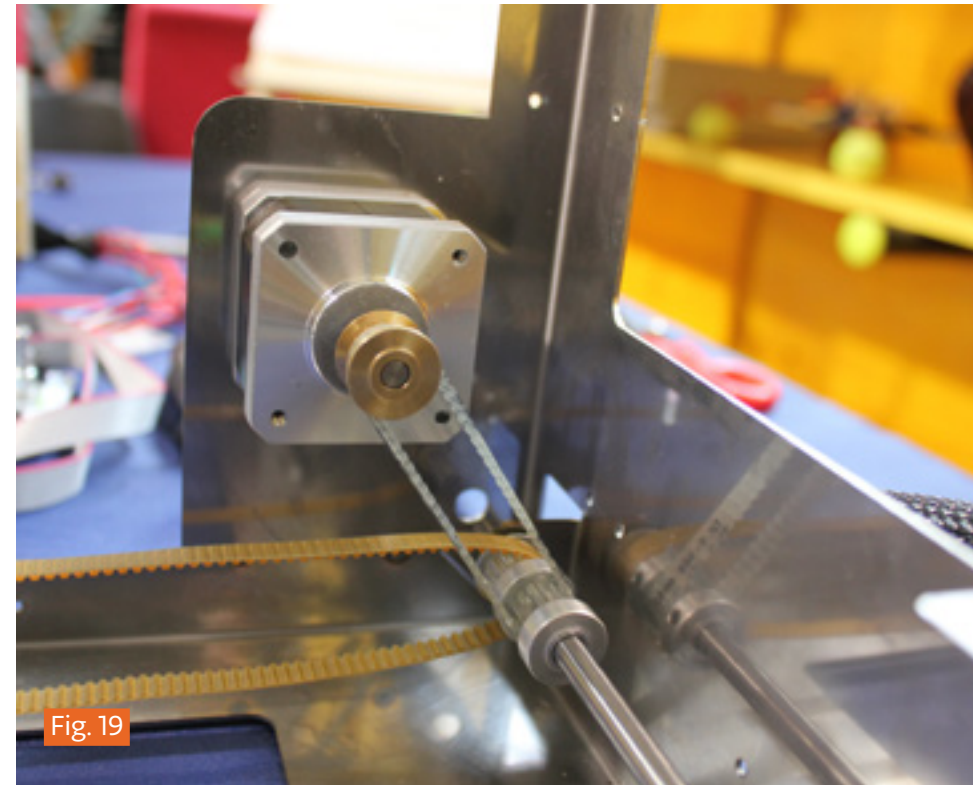
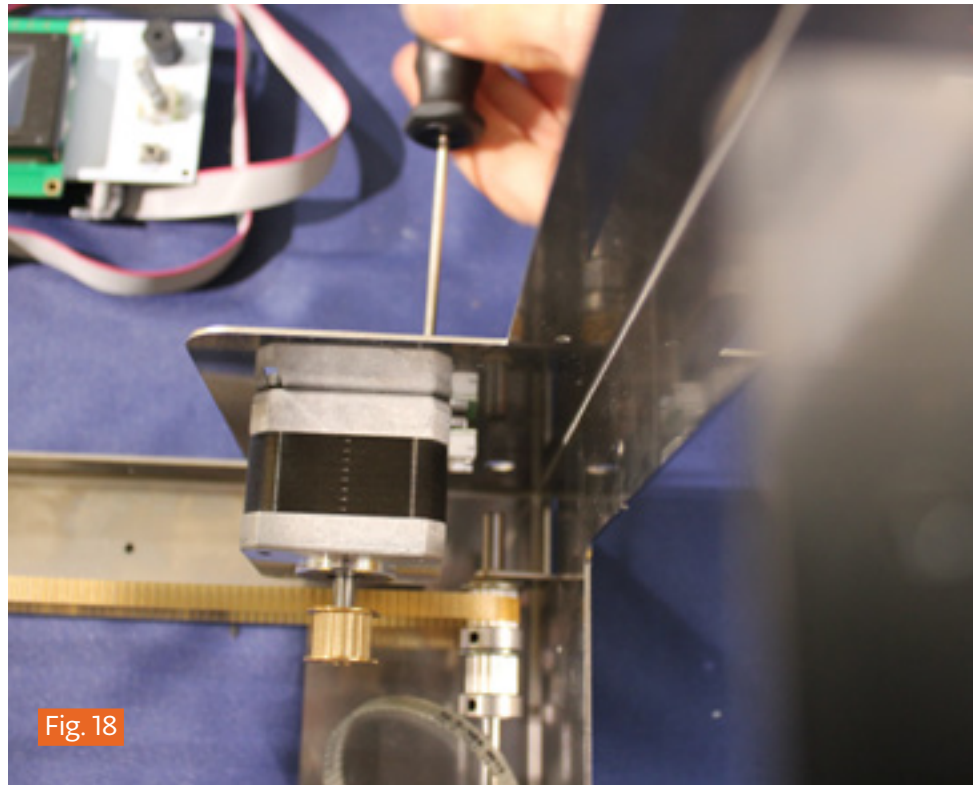


Fig. 18

Take the Y motor and using a crosshead screwdriver, unscrew screws no. 2 and 4 from the motor's back. Connect the motor cable with M3x35 bolts (2). Assemble the motor on the frame, leaving the connector oriented towards the frame's bottom.

Fig. 19

The T2.5 160 belt must be hooked up to the stepper motor pulley. Working on the same motor and tightening the two screws, you will pre-tighten the belt.

Fig. 20 - 21 - 22

Take the remaining grey cable and connect the white connector to the X motor (Fig. 20). Connect the motor cables (2): one to the Y motor (fig. 21) and one to the Z (fig. 22).

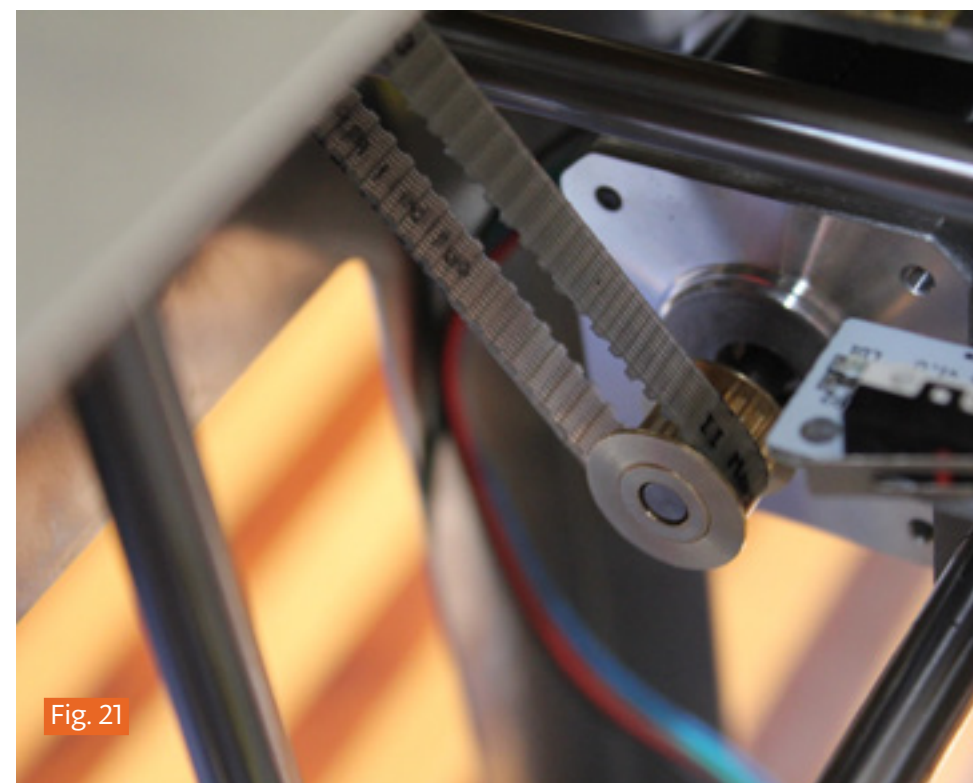
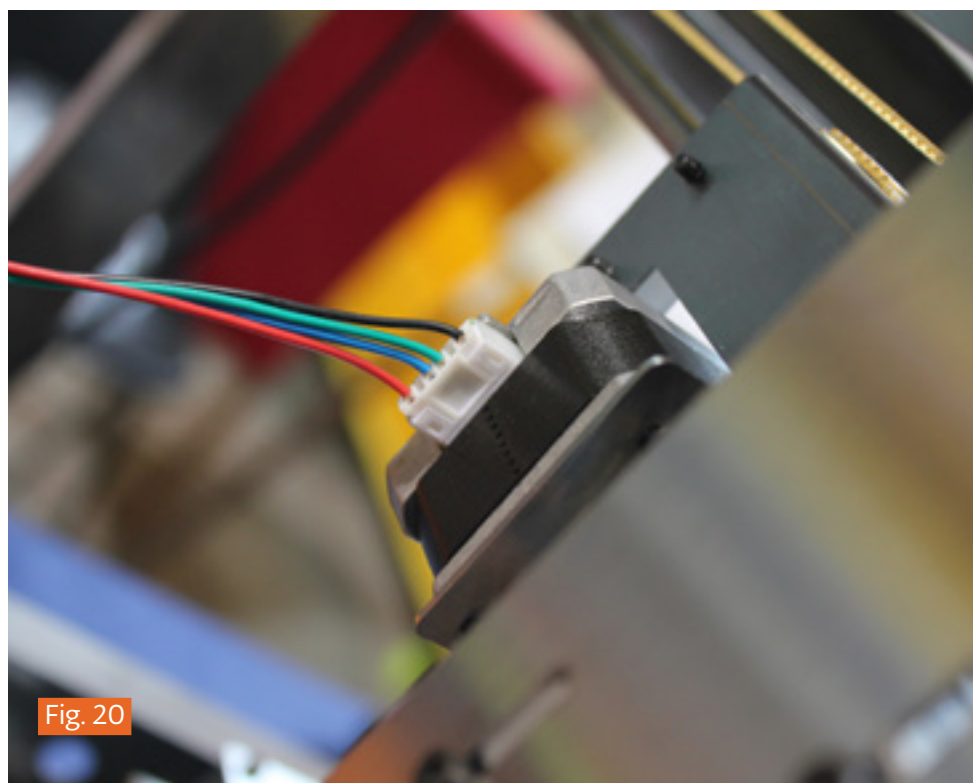


Fig. 20

Fig. 21

ASSEMBLING THE FRAME

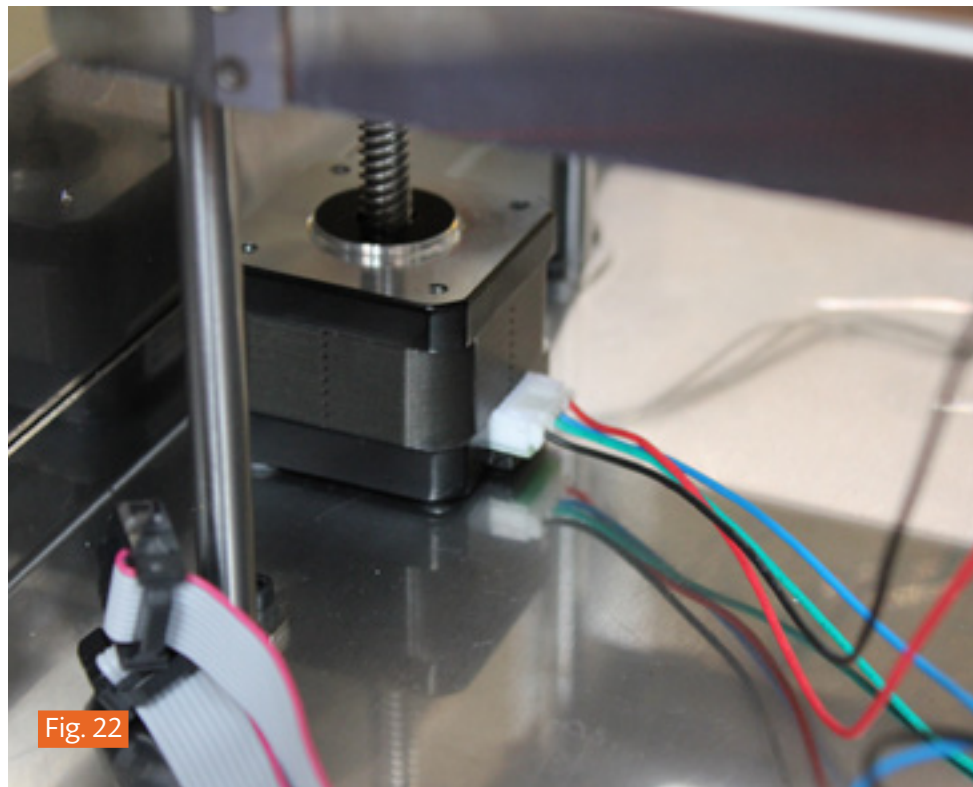


Fig. 23

Take the end stop three wire cables (2) (dedicated to the Z end-stop), cut off the tinned ends and remove about 10mm of the cover. Place onto every wire a 5mm piece of the 3mm shrink. Couple the wires by intertwining the same colour ends (red, black, blue) so you can obtain a 1.5m cable with connectors placed at each end.

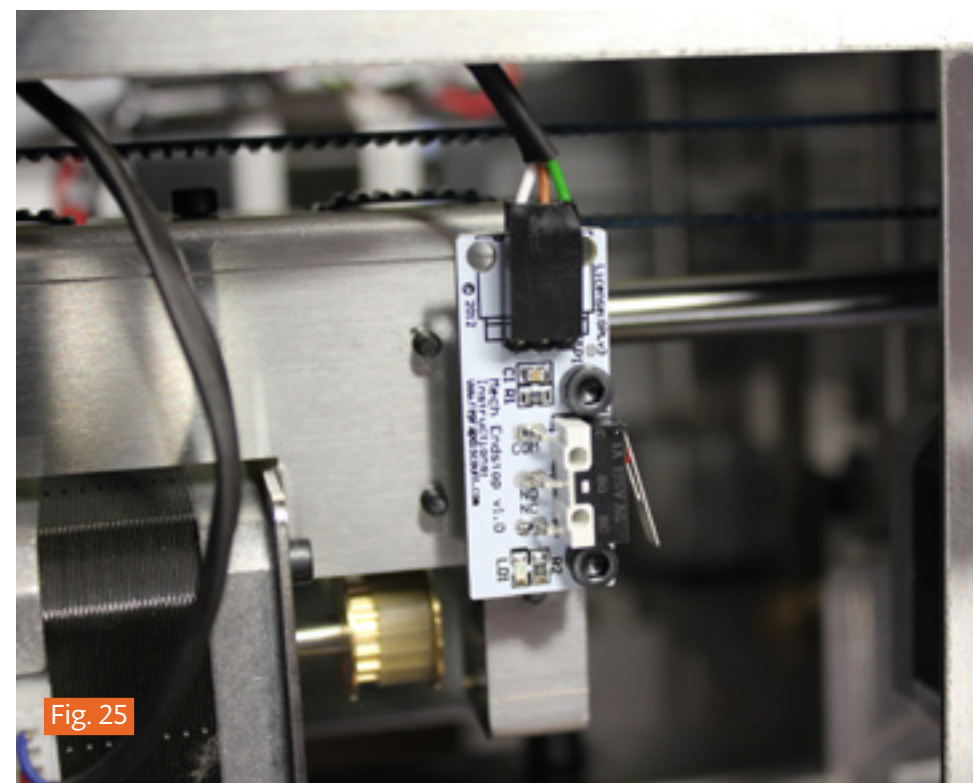
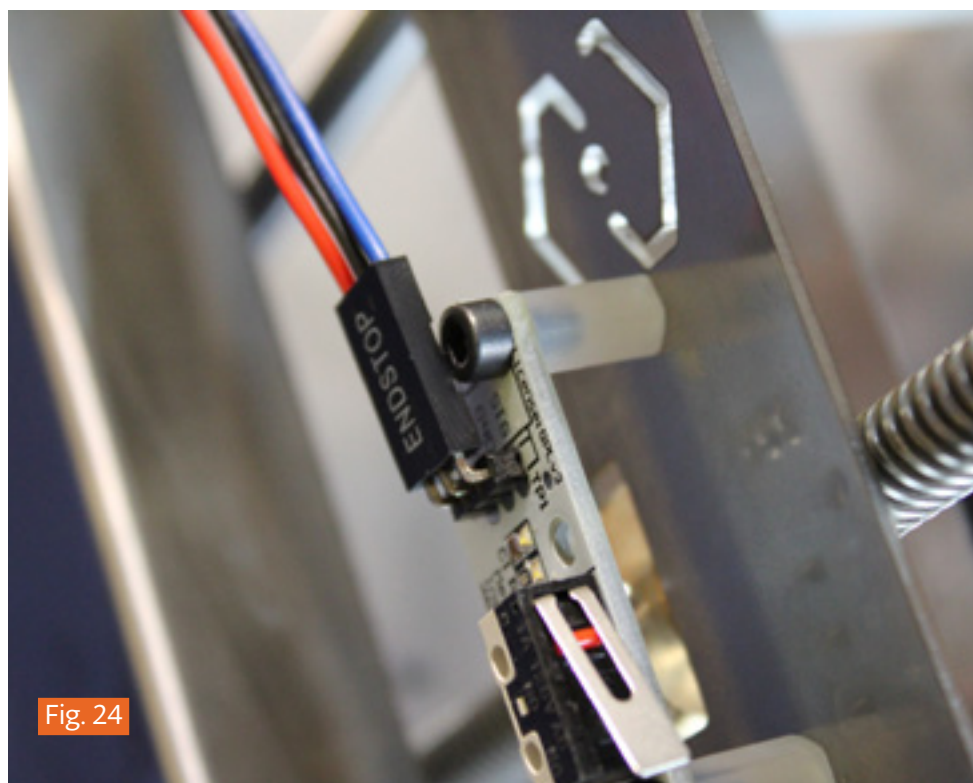


Fig. 24 - 25 - 26

Connect the soldered end stop three wire cables to the Z end-stop. Take care to respect the polarity: RED=VCC; BLACK =GND; BLUE=SIG (fig.24). Connect the two remaining grey cable connectors to the Y end-stop, the white-brown-green with polarity WHITE=VCC; BROWN = GND; GREEN = SIG. The remaining connector to X end-stop with polarity: YELLOW=VCC; GREY=GND; PINK=SIG.

ASSEMBLING THE FRAME

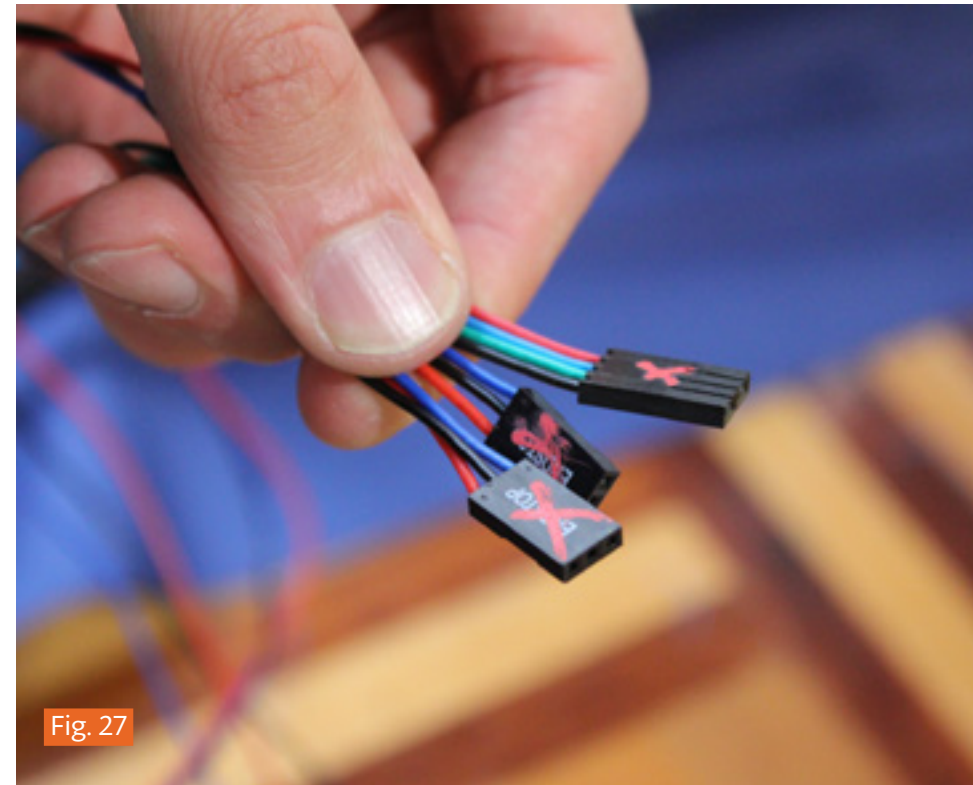
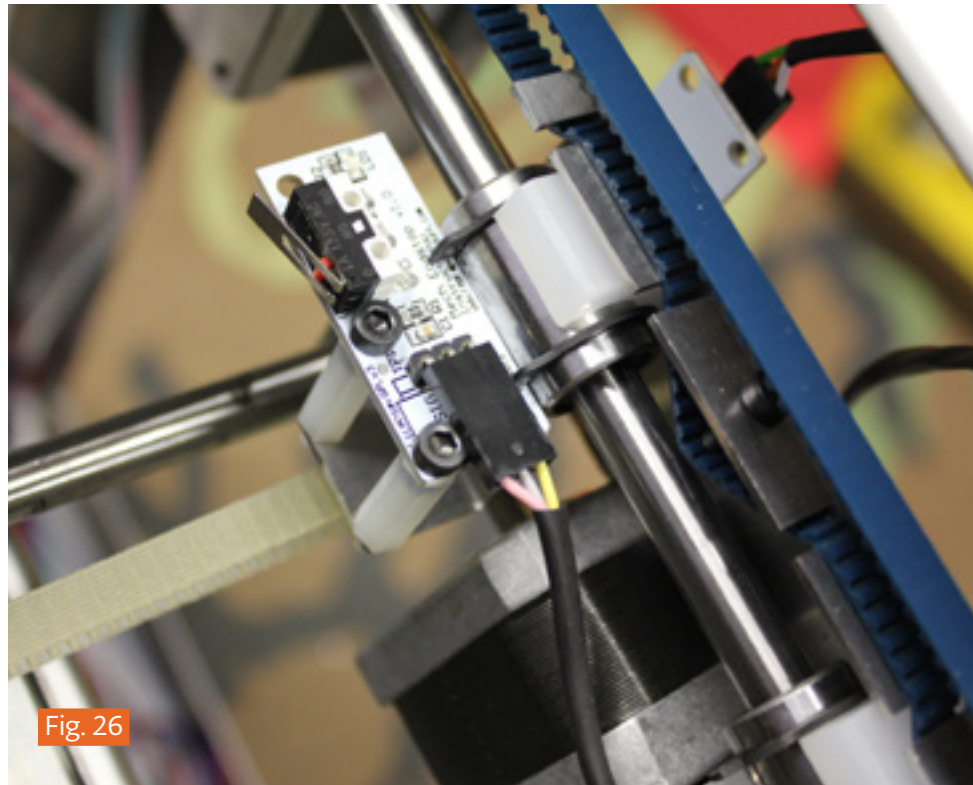


Fig. 27
It will help if you mark a X, Y and a Z on the connectors to help you with the wiring.

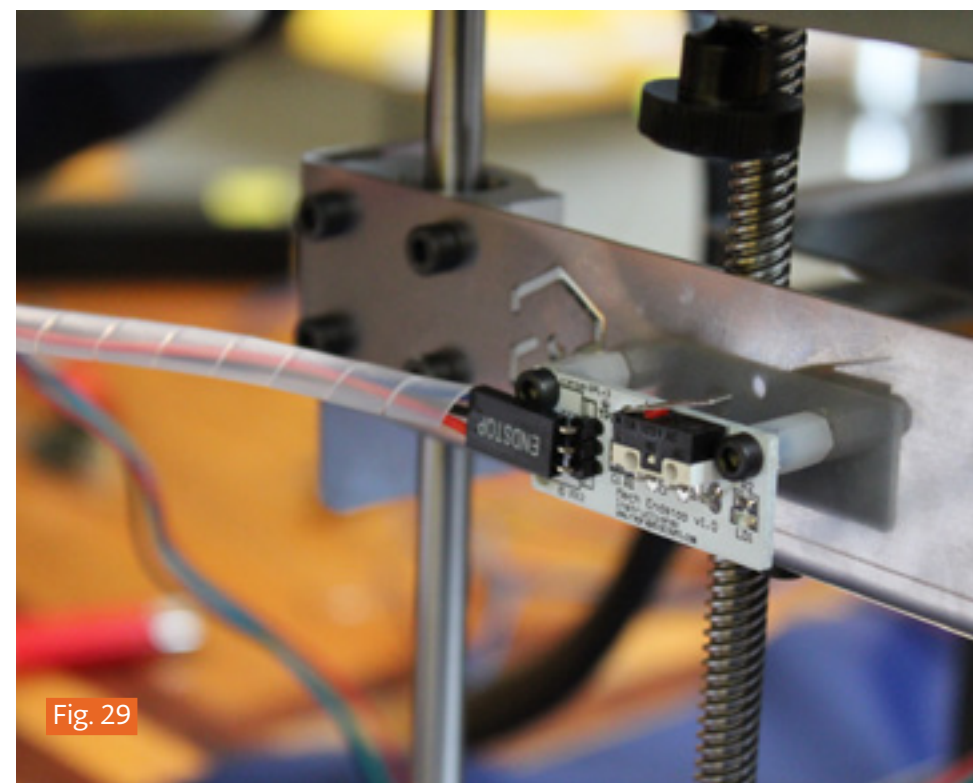
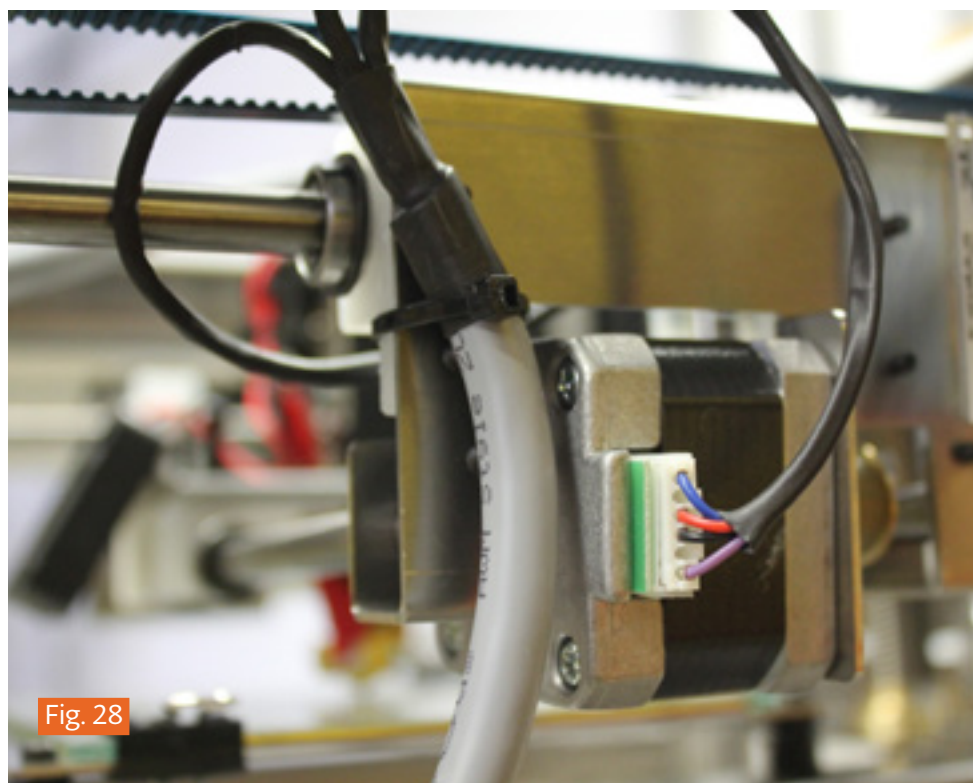


Fig. 28
Use a cable tie to secure the cable onto the shoulder, as in the picture.

Fig. 29
Use the cable-leads spiral to wrap the Z end-stop cable.

ASSEMBLING THE FRAME

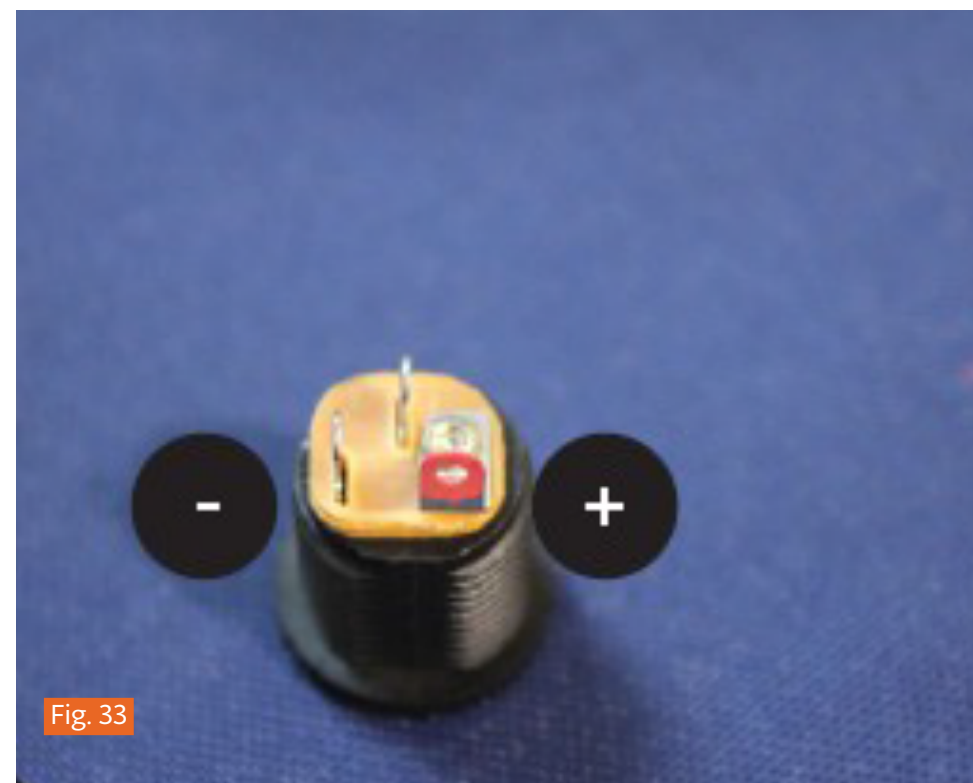
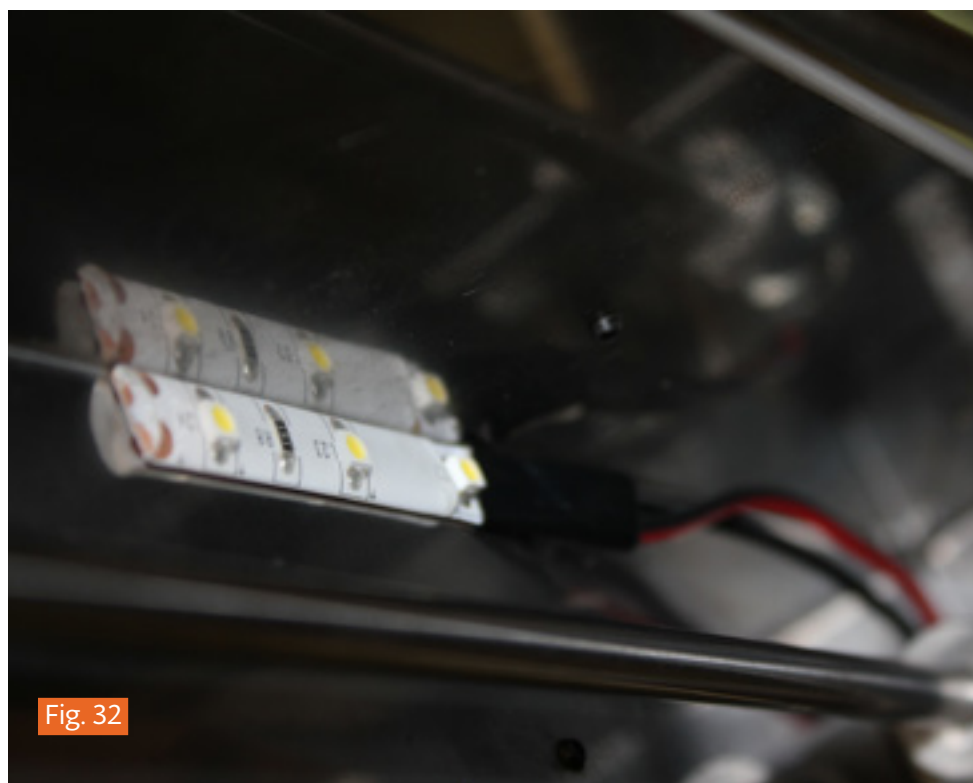
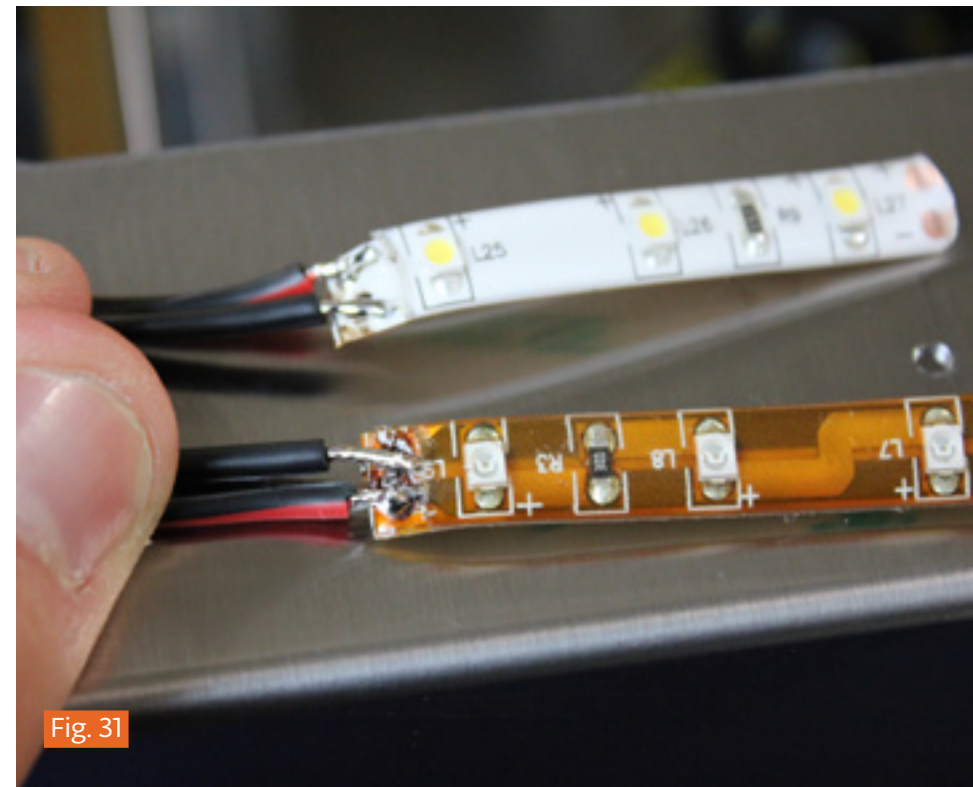


Fig. 30

Clean the contacts by removing the rubber protection from the white LED strip using scissors.

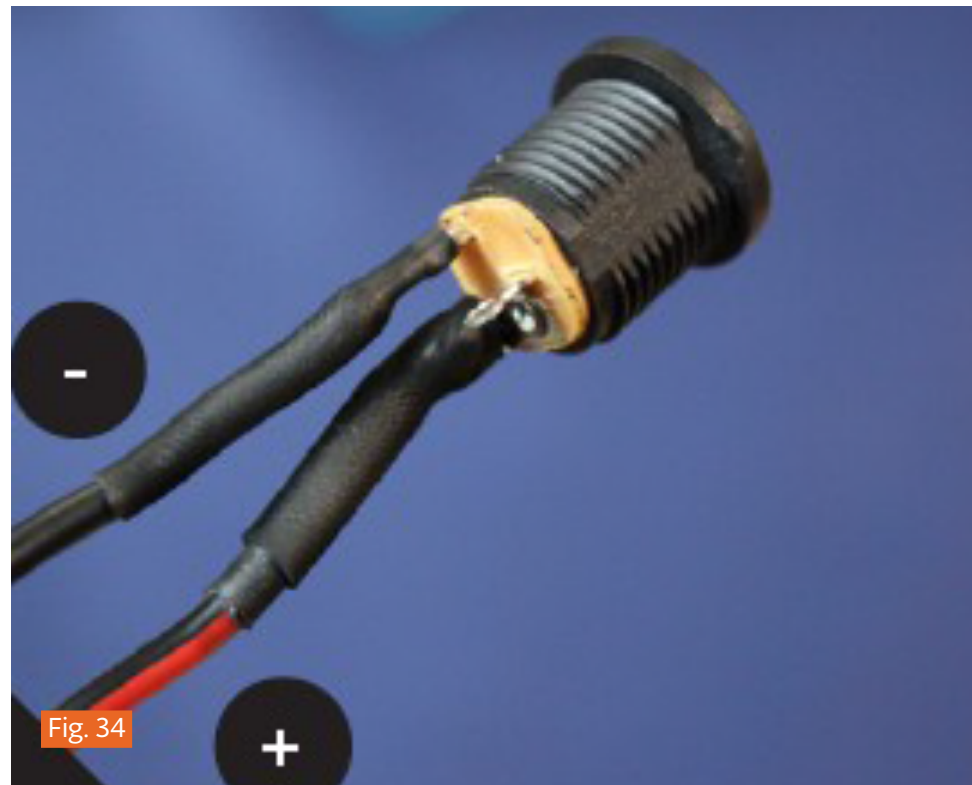
Fig. 31 - 32

Take the bipolar red-black cable and strip both ends. You need to solder the cables to the LED strip respecting the polarity (+red, -black). You can close off the contacts with insulating tape. Remove the adhesive band and attach the white LED to the frame inside the front of the printer, leaving the wiring oriented to the left (to the display).

Fig. 33 - 34

Take 40 cm of the bipolar cable, strip the cable ends and cover with two pieces of the shrink tube. With the socket, locate the + and - pole (in the picture you can see the +

ASSEMBLING THE FRAME



poles marked in red) and solder the ends, + RED, - BLACK.

Fig. 35 - 36

Insert the socket cables inside the hole that you find in the back side of the printer and fasten it with the black plastic nut.

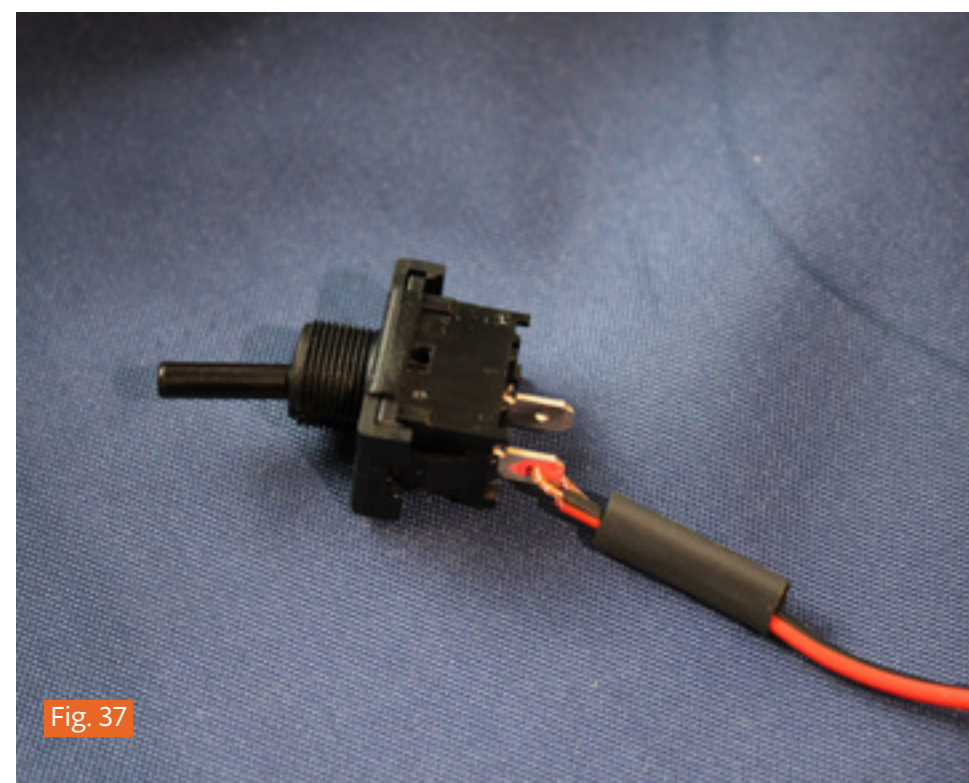
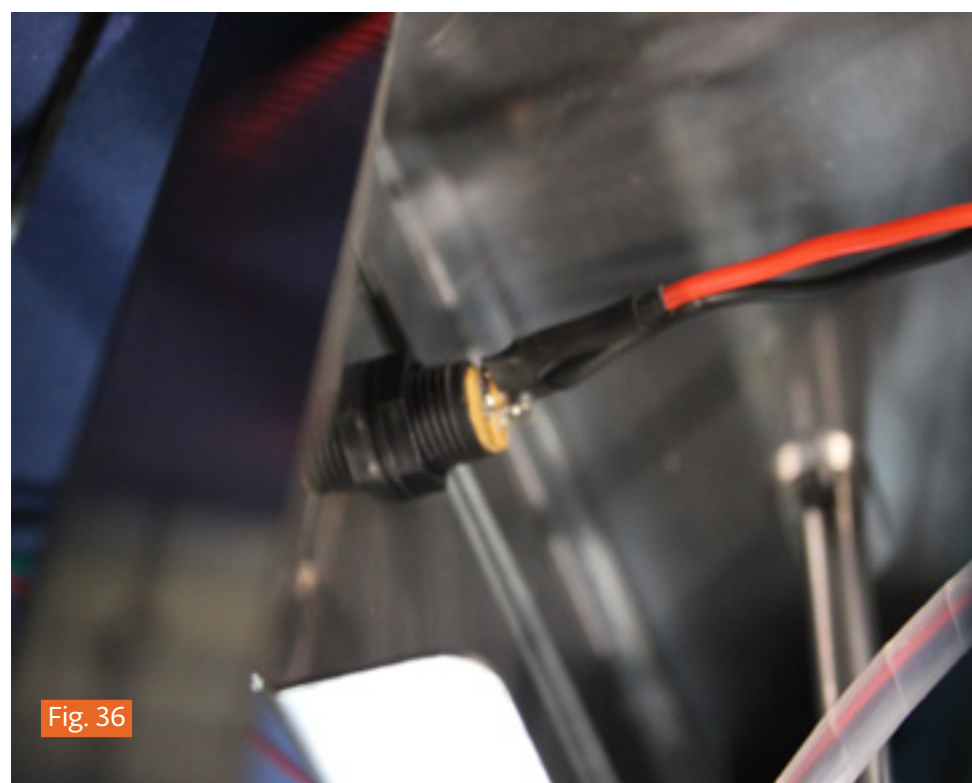


Fig. 37

Get the red cable coming from the socket: cover it with a piece of shrink and solder it on one of the two switch sockets (there is no difference between them).

ASSEMBLING THE FRAME

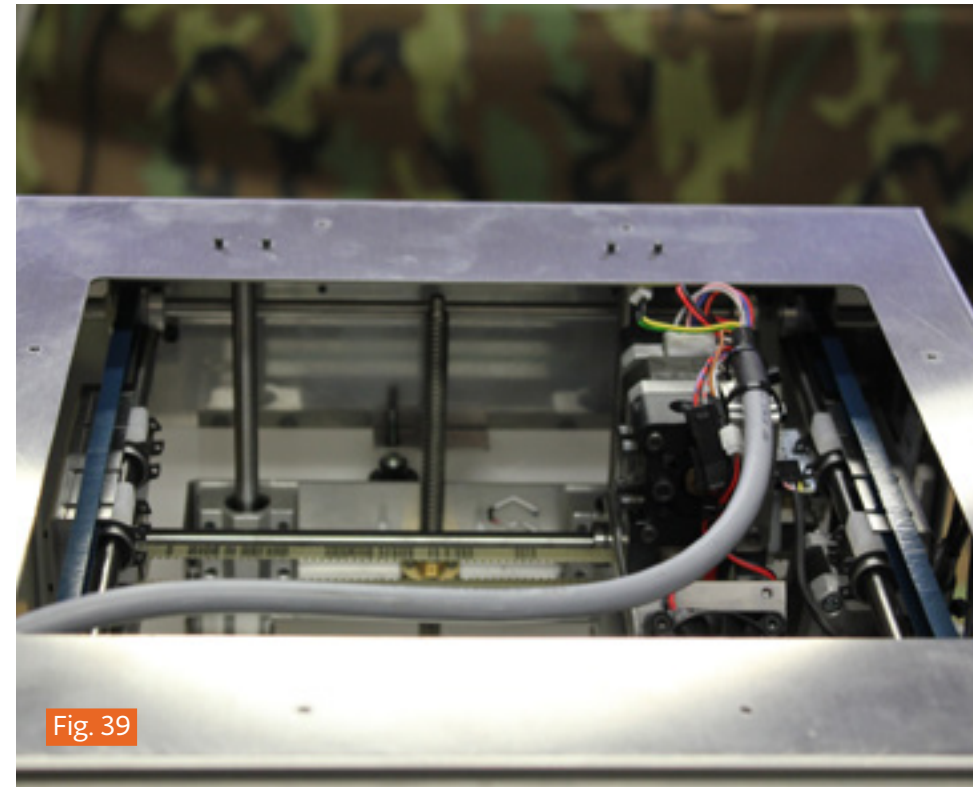
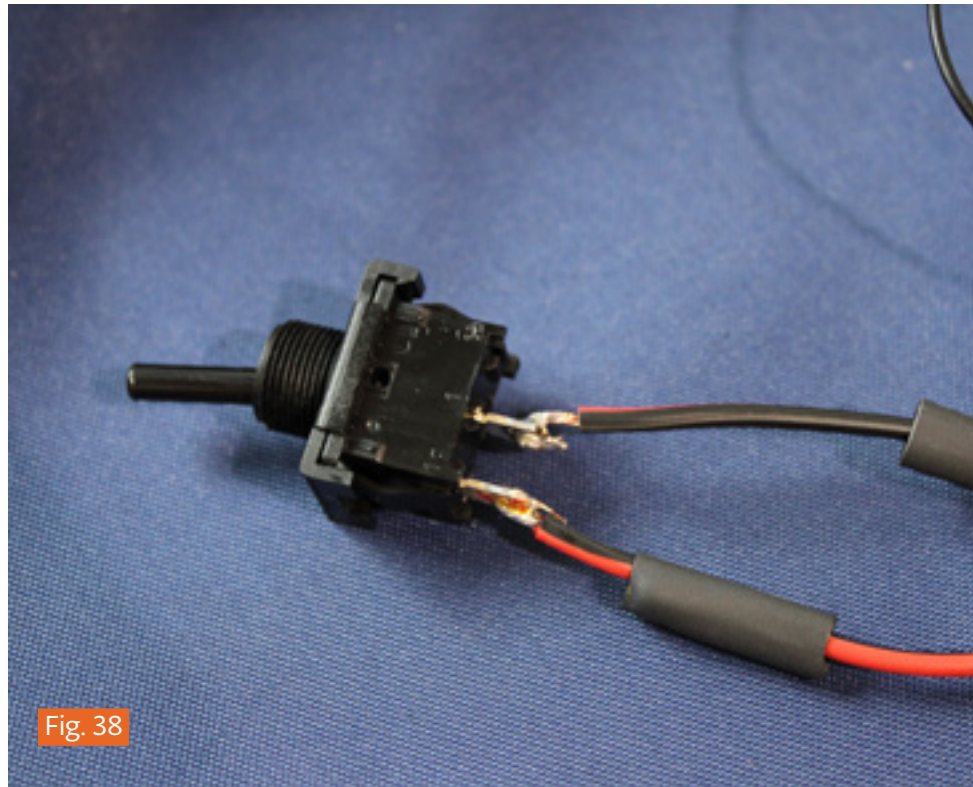


Fig. 38

Take about 20cm of the red cable and strip the ends, cover it with shrink tube and solder it at the other end of the switch.

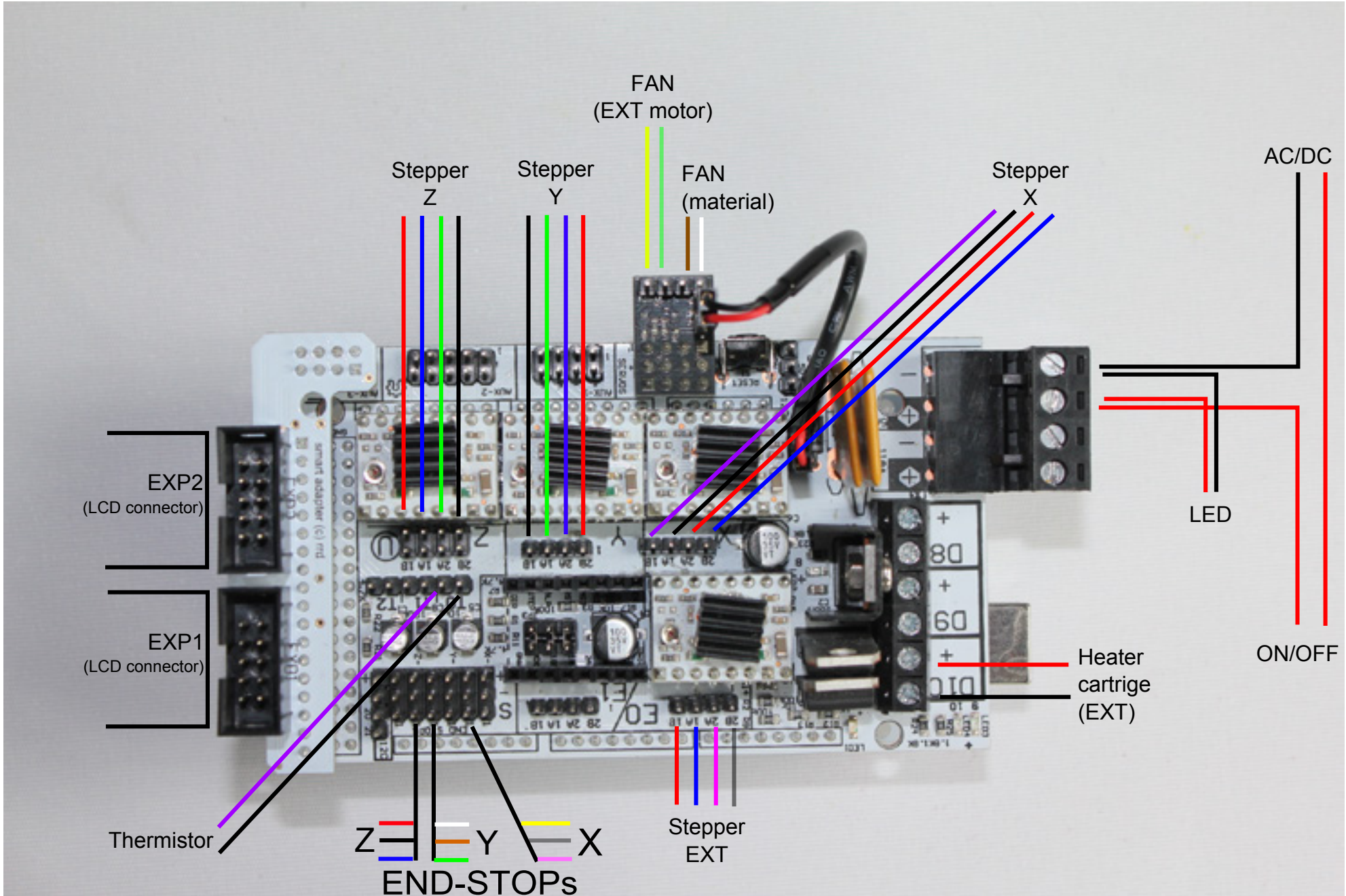
Fig. 39

Get the hot end and move it to the right bottom of the printer (as pictured). The wiring should have enough length to move there without obstacles.

Fig. 40

Secure the cable with a cable tie onto the left front side, to the frame's holes. Once secure, the wiring should look like an elegant "S", as shown in the previous picture.

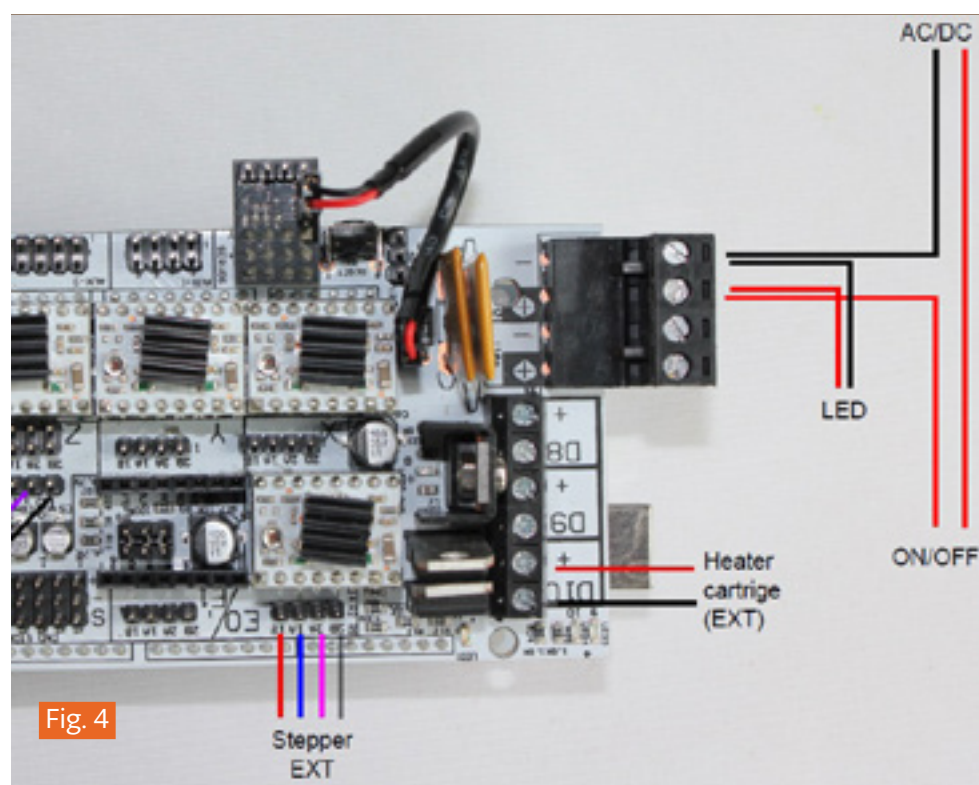
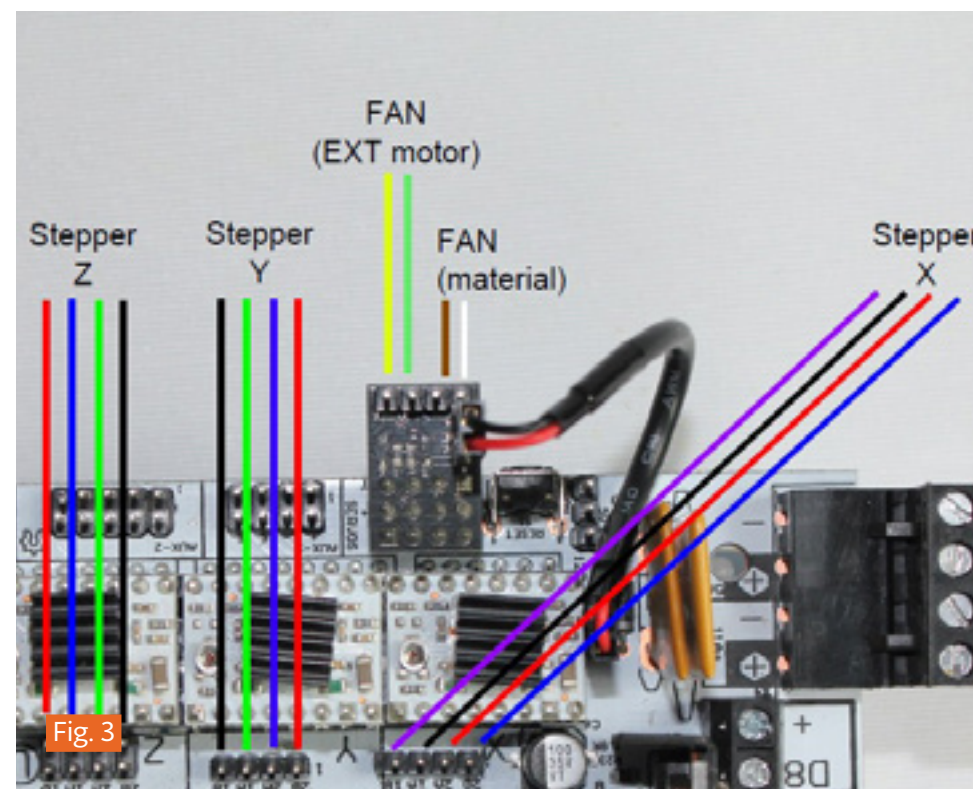
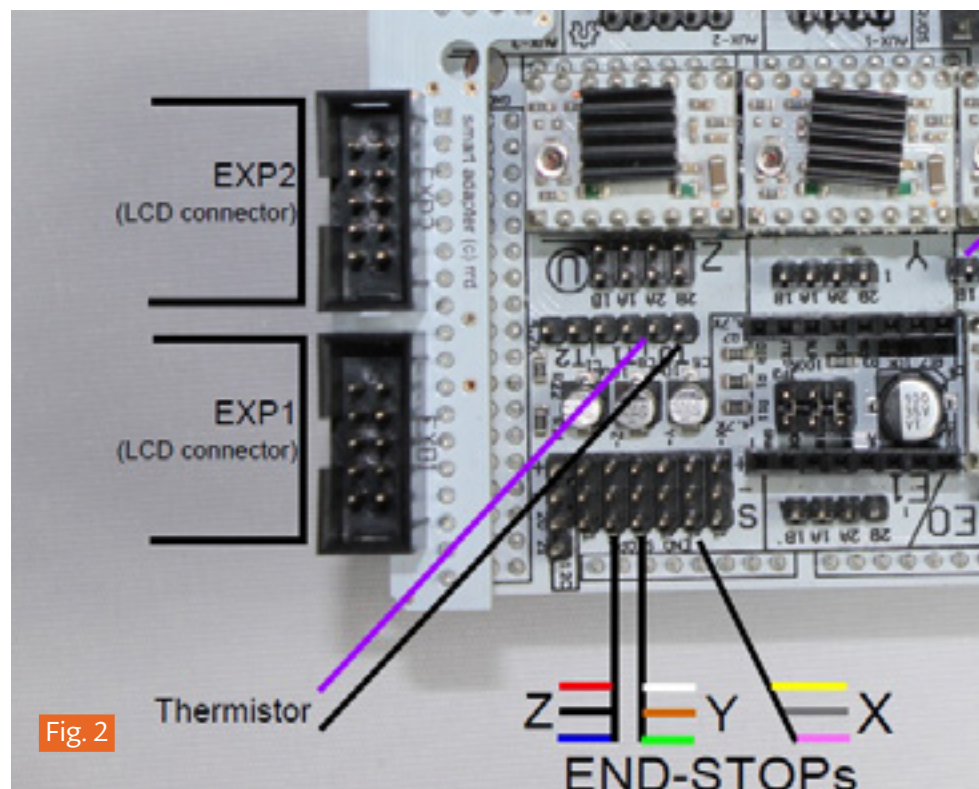
BOARD WIRING



Your Materia 101 is assembled and ready to be wired. You need only a flathead electrician's screwdriver.

Fig. 1
In this step, we are going to wire the board.

Fig. 1



BOARD WIRING

Fig. 2

Start with the wiring of the two displays. Take the 'EXP1' and 'EXP2' connectors and insert them inside each pin (they are marked on the display and on the board), oriented with the tap looking to the board's border. Now connect the end-stops (3), paying attention to the polarity (as pictured). The polarity is not a problem in this case.

Fig. 3

Now move on to the X, Y and Z stepper motors' wiring. They have also been marked to identify them more easily. Starting from the first X stepper connector on the picture's right, we connect all three of them, paying close attention to the orientation. If not connected like in the picture, the motors will run backwards. We

now connect the fans, paying close attention to the polarity (as pictured).

Fig. 4

Now connect the extruder's stepper with the correct polarity, as shown in picture. Now take the screwdriver and start to connect the cable of the heating cartridge (red and grey but have no polarity) into the slots located in the lower right corner, as shown in the picture. Finally, connect it, paying attention to polarity. The LED goes in the same slot where we will connect the power supply. The black cable coming from the wall socket goes into the first top slot (negative) and the red cable coming from the switch goes into the slot below (positive).

BOARD WIRING

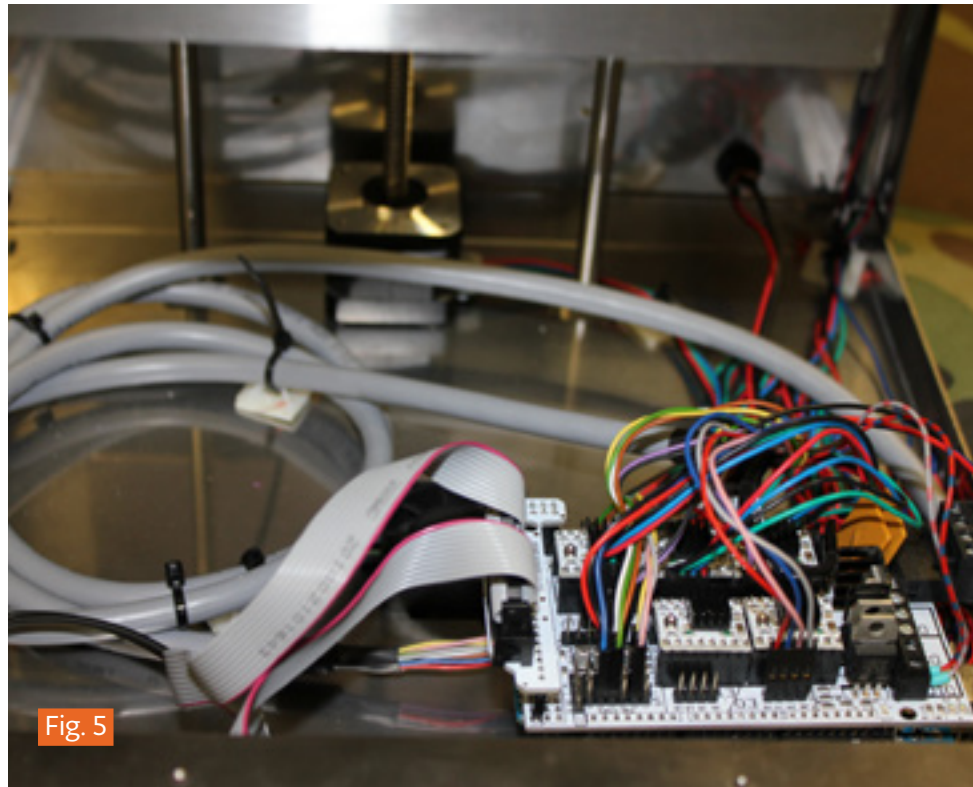


Fig. 5

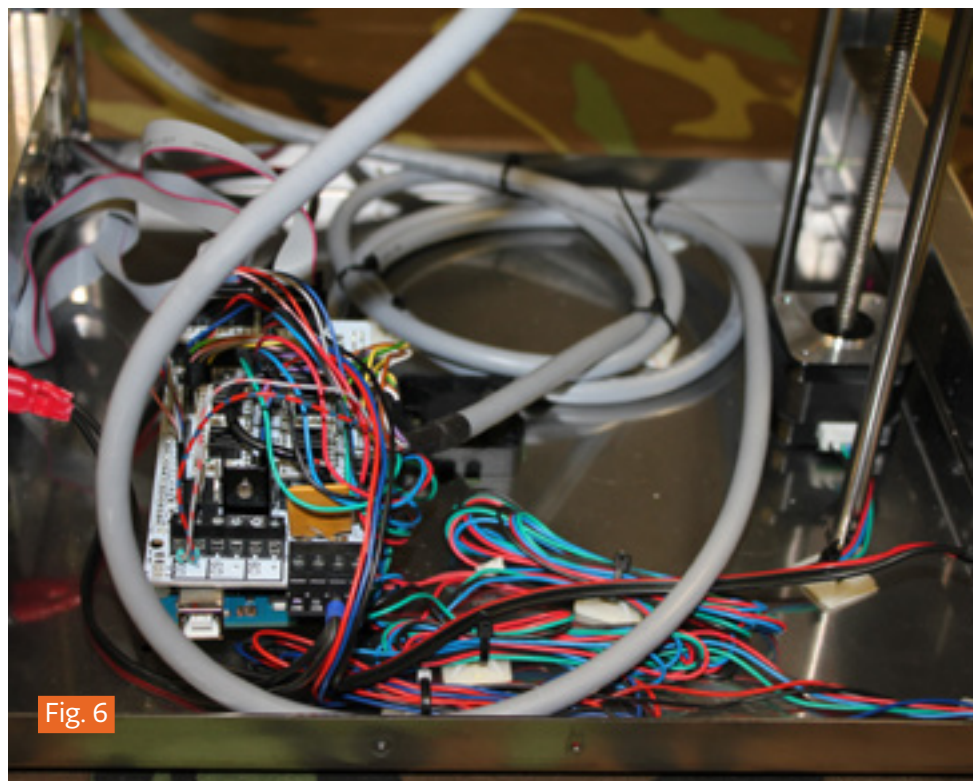


Fig. 6

Fig. 5 - 6

Order the wiring so it is not an obstacle to the board fan. Join the machine's bottom wiring (Y stepper, Z stepper and Z end-stop cable) with cable ties. Lead them to the frame's side, in the direction of the board. The excess part of the wiring should be wrapped together with some cable ties. At this point, lead the LED cables to the front frame board. Now wrap the excess wiring of the extruder and of the X carriage. Use the cable ties and position them on the printer's bottom.

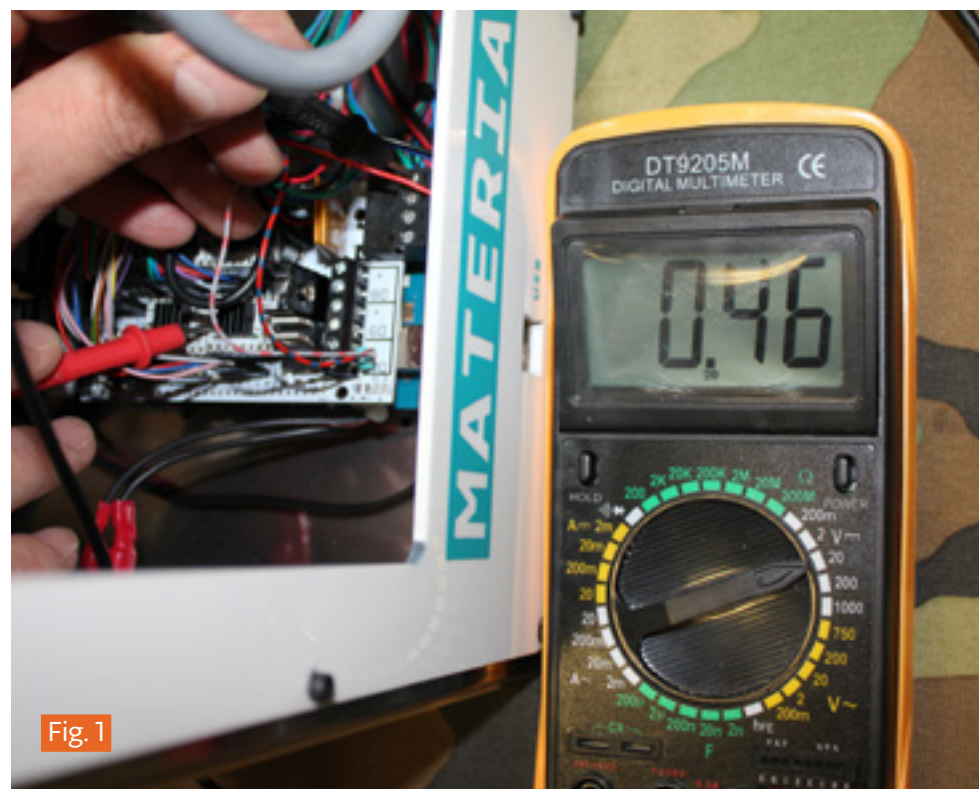


Fig. 1



Fig. 2

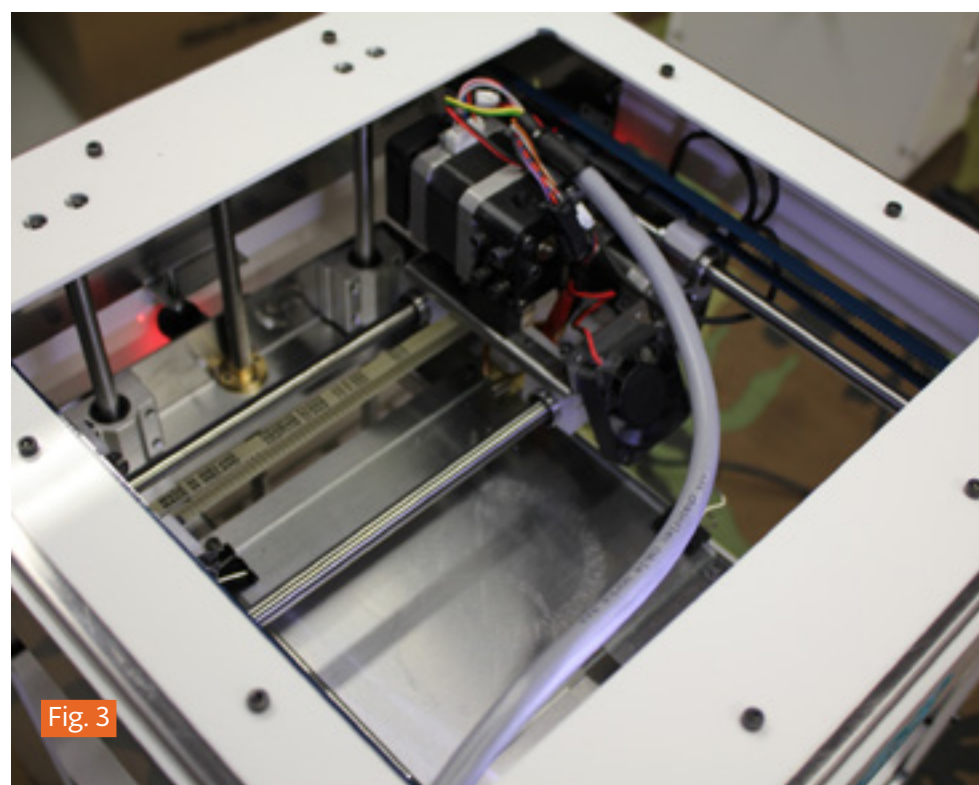


Fig. 3

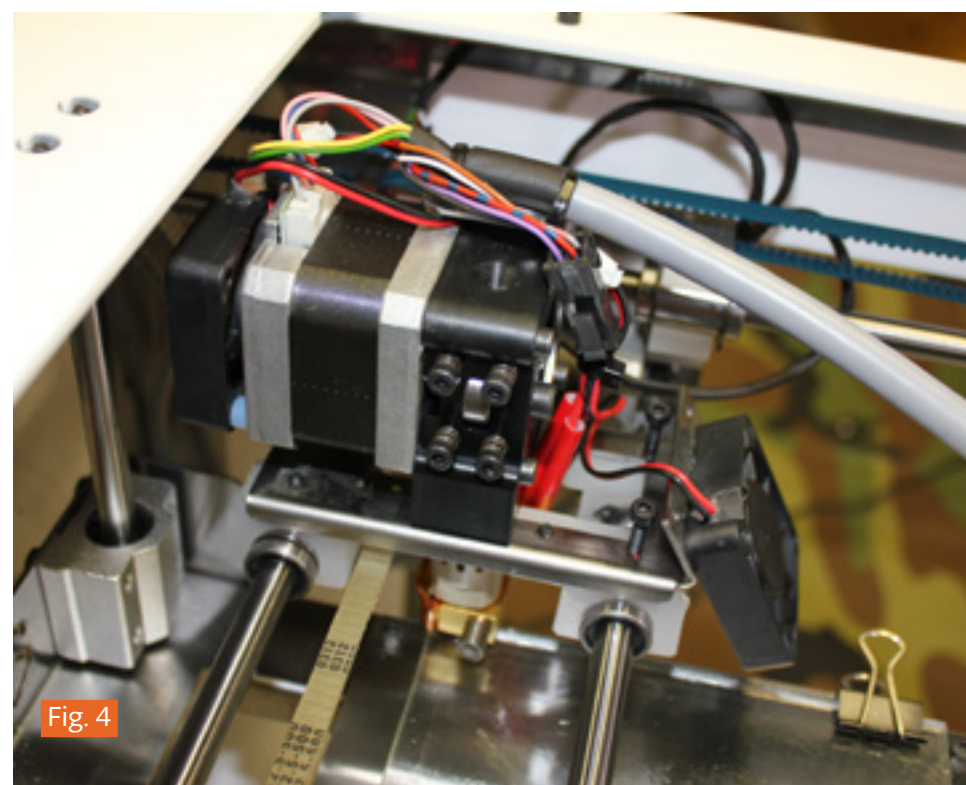


Fig. 4

CALIBRATION

Take a look at the power supply's wiring. If it is OK, turn it on! Now we can look at a couple of things. If you do not see "MATERIA 101" on your LCD panel, you need to upload the firmware onto your 3D printer. You can download it here: <http://arduino.cc/en/Main/ArduinoMateria101>

adjusting the potentiometers and use a ceramic screwdriver.

Fig. 2

On the display you will read "Materia 101" and a thermistor temperature next to the ambient one.

Fig. 3

From the LCD menu select Prepare -->Autohome : you see that X, Y e Z motors will read every end-stop (X to the right, Y to the bottom, Z goes up).

Fig. 4

When the autohome has been triggered, the back extruder motor fan must turn on.

Fig. 1

When the printer is on, the white LEDs are also on. Take the multimeter and set it on the DC reading; place the black tip on the negative input (black). Place the red tip on the stepper motor's driver potentiometer. Potentiometers are the small star-shaped screws that you find on the driver. To check the stepper driver Vref, adjust the Vref with the following values: X0.4 Y0.4 Z0.4 E0.5 and adjust the potentiometers with a small screwdriver. Be certain not to touch anything else conductive when

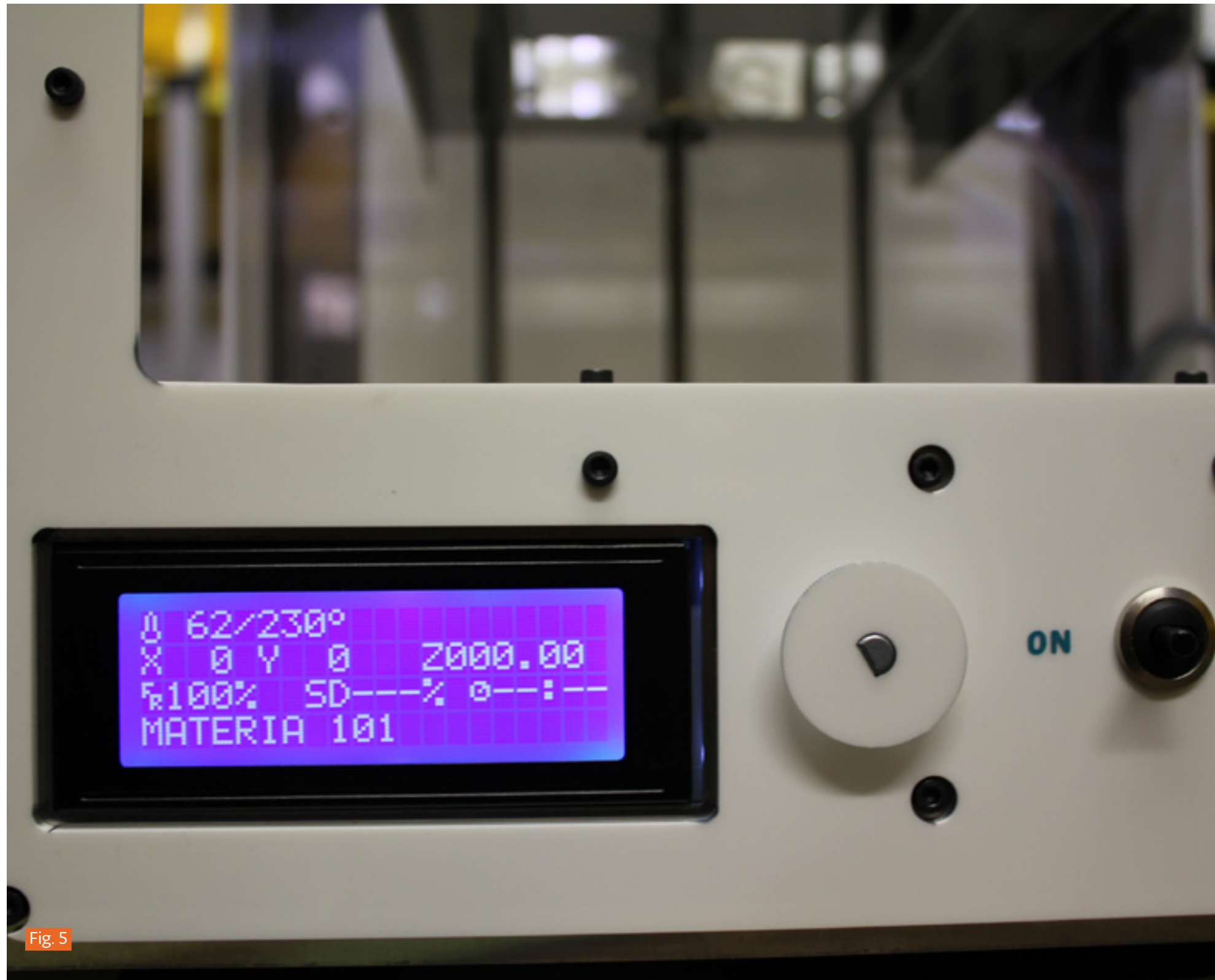


Fig. 5

CALIBRATION

Fig. 5

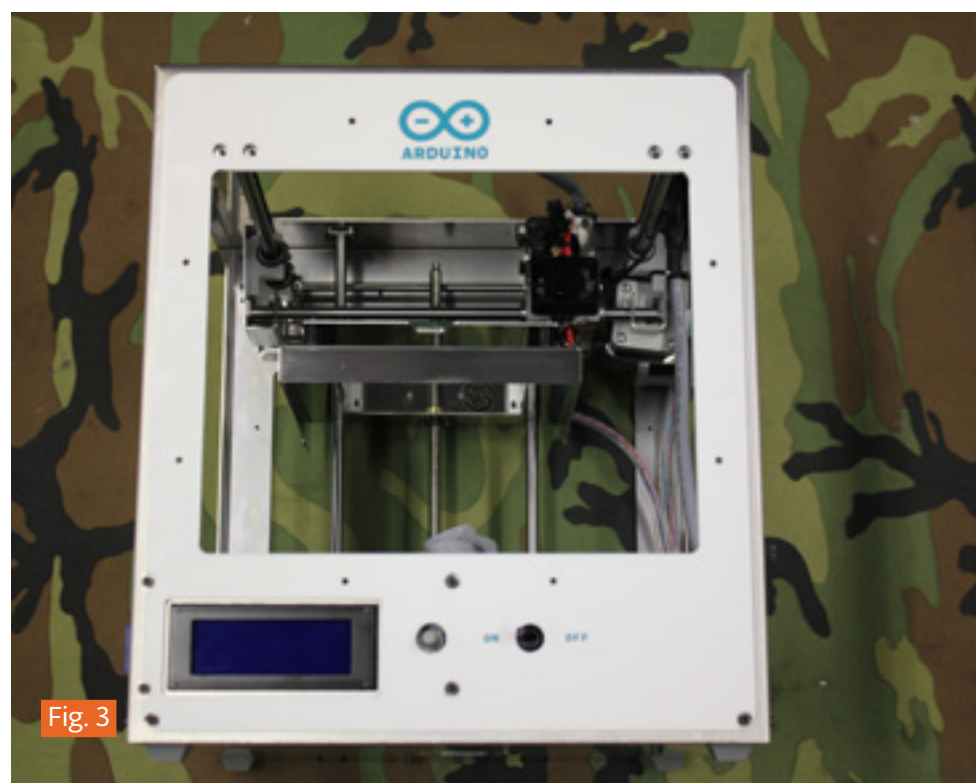
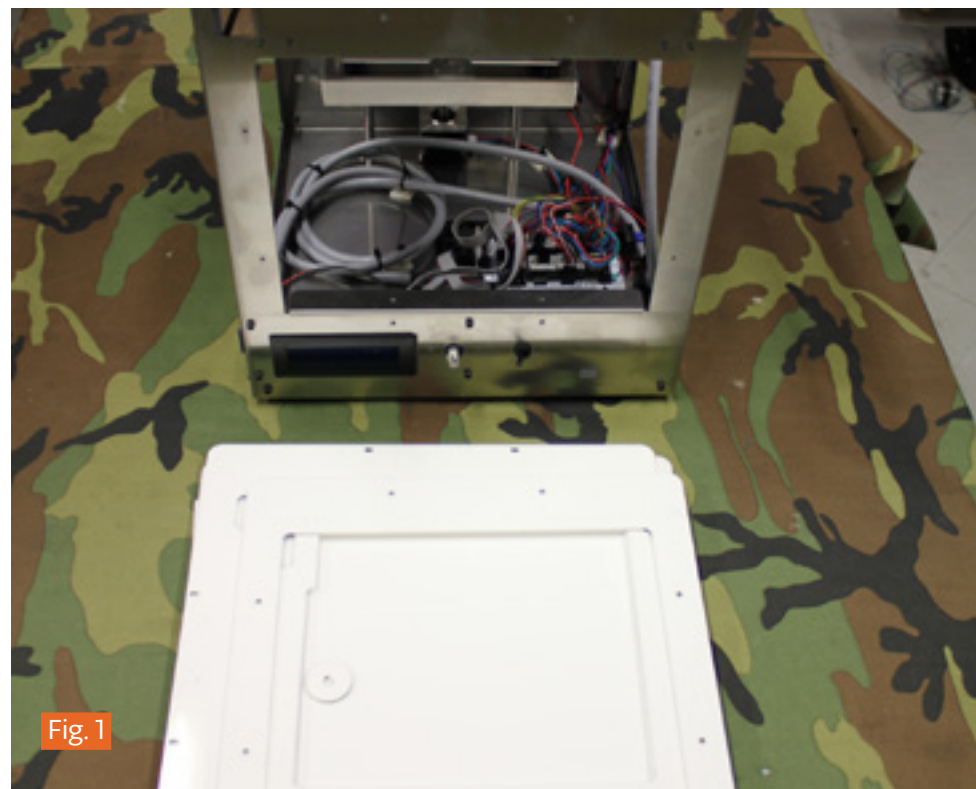
If you choose Prepare -->Preheat from the LCD menu you will see the LCD temperature going up and the frontal fan turning on.

From the "Prepare" menu you can try to launch the "Change Filament" command; the printer will heat up and the axes will finding their home position. When the printer is at the correct temperature it will unload the filament. The extruder motor will run clockwise with a beeping sound at the end. You must click the knob to stop it. Now the motor is running counter-clockwise. You can insert a filament inside the extruder by using just a bit of pressure.

IF YOU HAVE NOT ENCOUNTERED ANY PROBLEMS SO FAR, YOU ARE DOING A GREAT JOB!

10

SHELL AND FINISHING



SHELL AND FINISHING

Fig. 1

You will need:

- Pre-assembled and tested printer
- Machine case kit
- Arduino Materia 101 sticker kit
- M10 screw with 2 M10 cap nuts
- M3x10 bolts (8)
- M3x6 bolts (36)
- Washers (4)
- ON/OFF switch sleeves
- Control knob
- M3 nuts (8)

Fig. 2

Paste on the Arduino Materia 101 stickers as you see in the picture.

Fig. 3

Remove the wrapping from the front case and begin putting it on the printer and fasten it on with M3x6 bolts (8).

Fig. 4

Push the On/Off switch, from the printer's inside to the outside, leaving the groove (which means the OFF position) to the right.

SHELL AND FINISHING

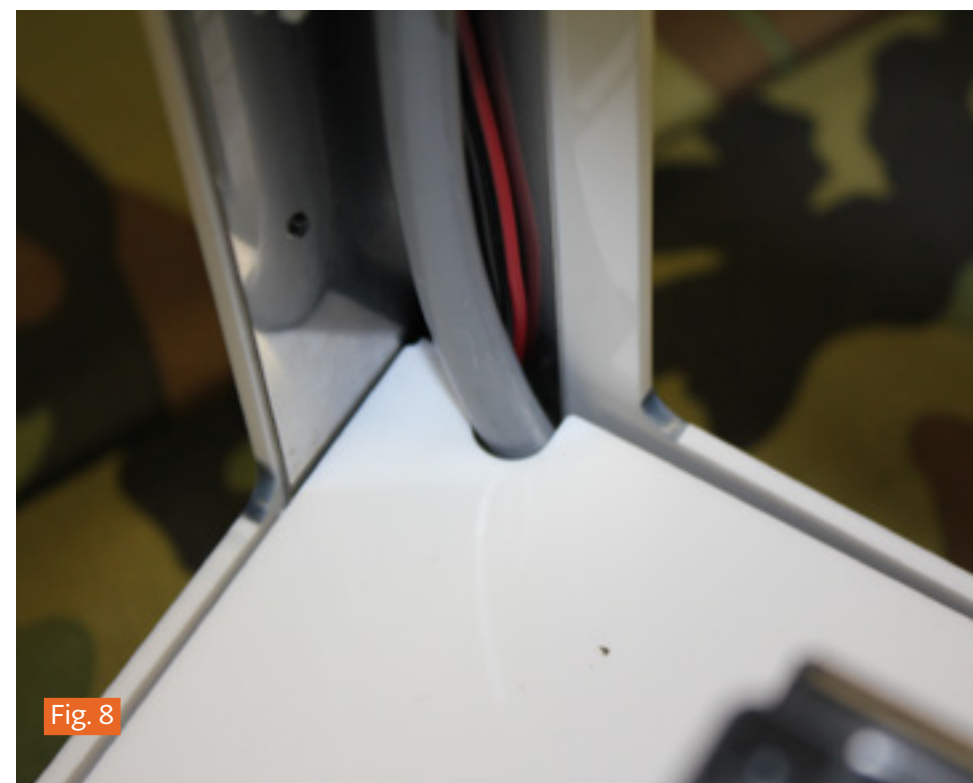
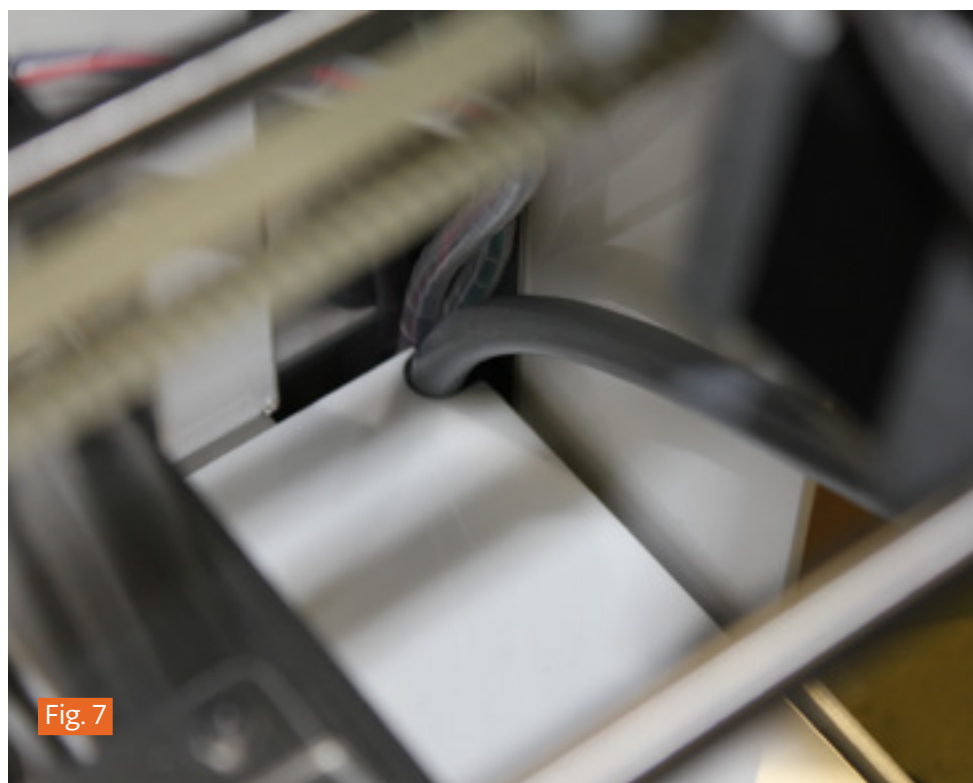
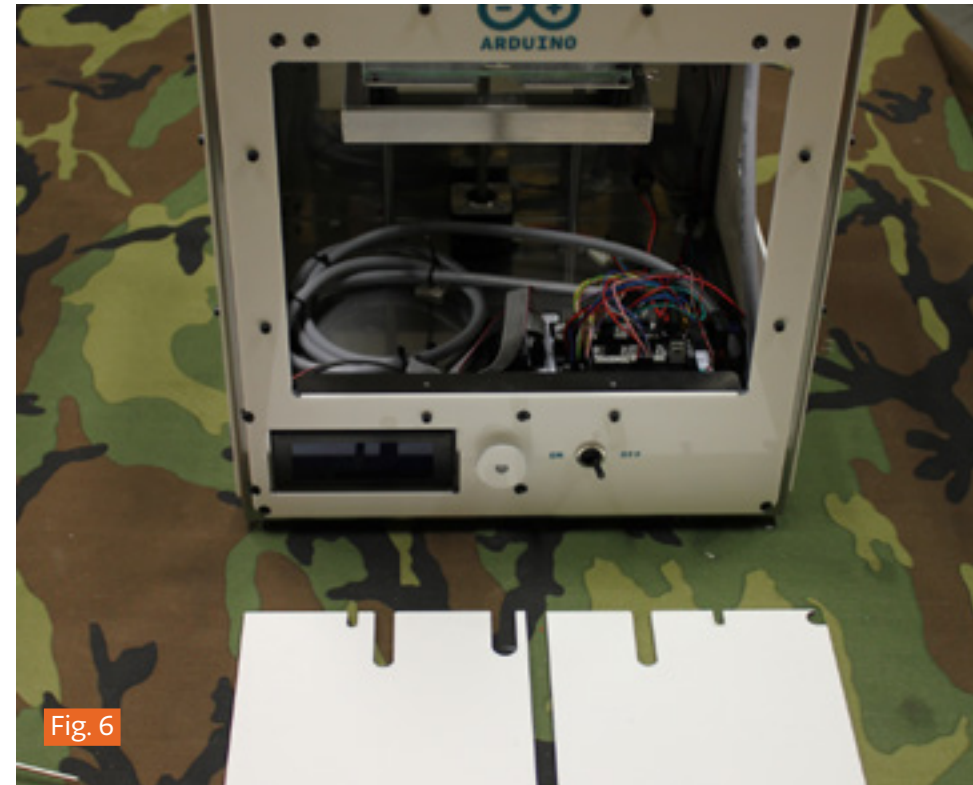


Fig. 5

Screw on the switch sleeve. Take the knob and insert it onto the display's potentiometer.

Fig. 6

Fasten all the external covers.

Fig. 7 - 8 - 9

Take the two electronic part covers and insert them one at a time. Start from the bottom and make the cables pass into the appropriate slots, as in photo. Attach the two bulkheads, using the M3x10 bolts (4) and the 4 washers.

SHELL AND FINISHING

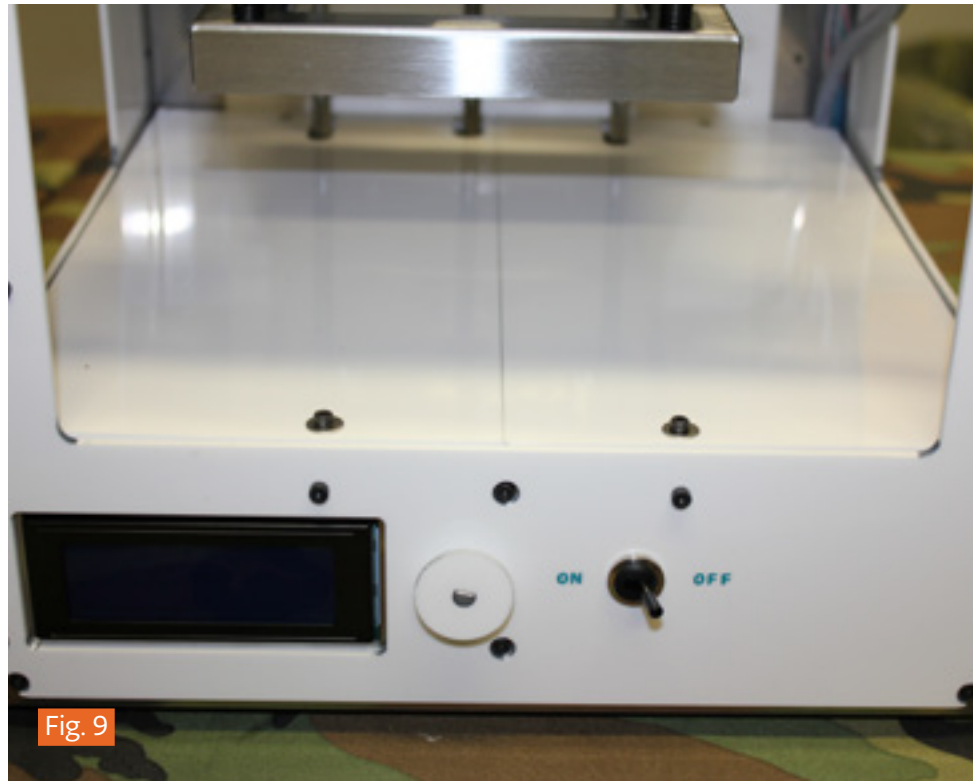


Fig. 10 - 11 - 12

Assembling the spool holder.
Using the M3x10 bolts (8) with the M3 nuts (8), assemble the spool holder. Apply the Arduino's sticker onto the back case. Insert the spool then the M10 threaded bar, securing it with M10 cap nuts (2).



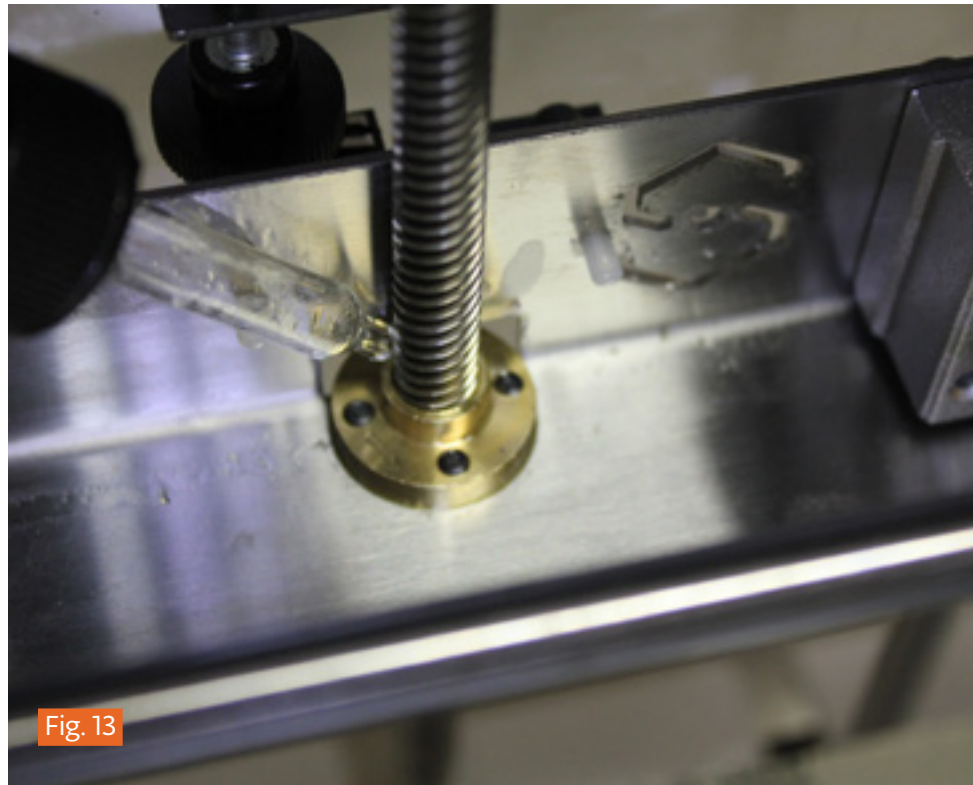


Fig. 13

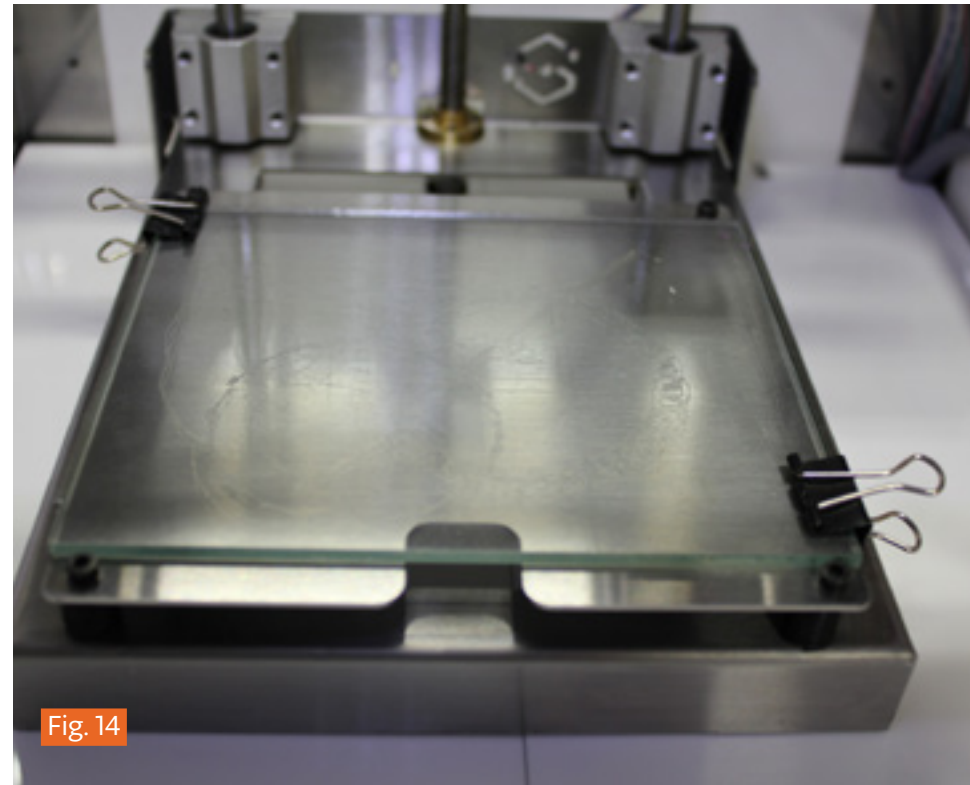


Fig. 14

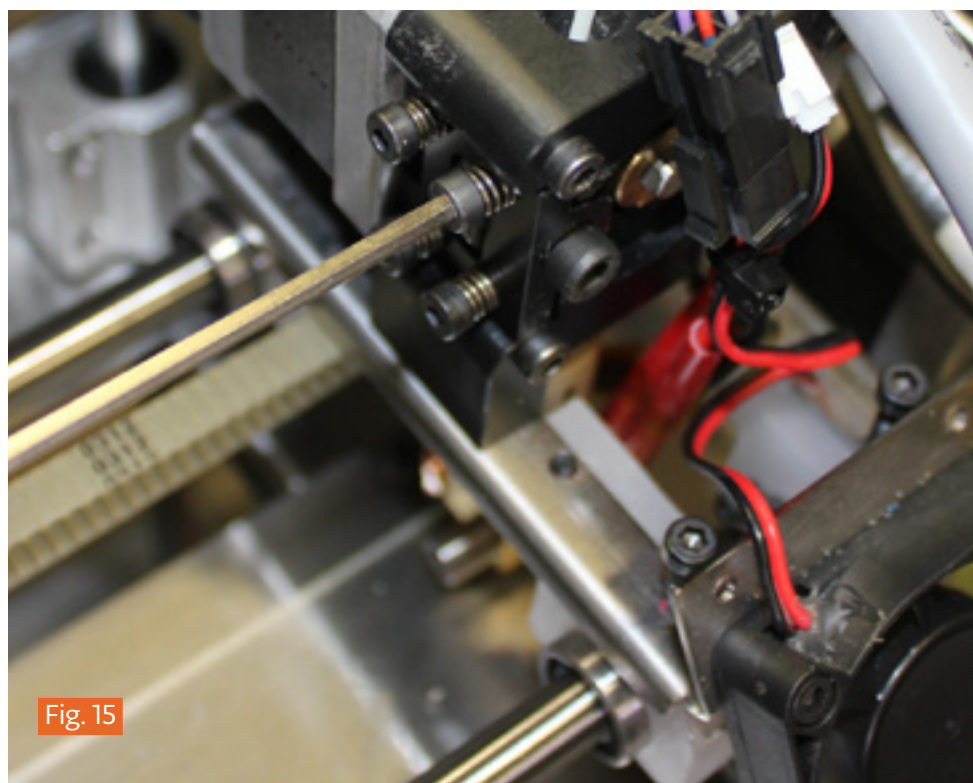


Fig. 15

SHELL AND FINISHING

BEFORE THE FIRST PRINT:

Fig. 13

Lubricate the Z lead screw with sewing machine oil. Spray hair spray on the glass printing bed.

(NEVER INSIDE THE PRINTER)

Fig. 14

Put the glass on the printing bed and hold it there with the clips.

Fig. 15

It is time to fix the springs on the extruder. Choose the option "Change filament" from the printer's menu. Wait until the machine has finished the expulsion cycle. Then you can insert the filament. While loading, try to block the wire with your fingers. If this should cause a skid of the pulley on the filament you have to tighten the spring until the motor should lose steps (you

should hear a noise like a "tak tak tak"). Be careful not to tighten the springs too much: this will cause a loss of steps to the motors and grind the filament.

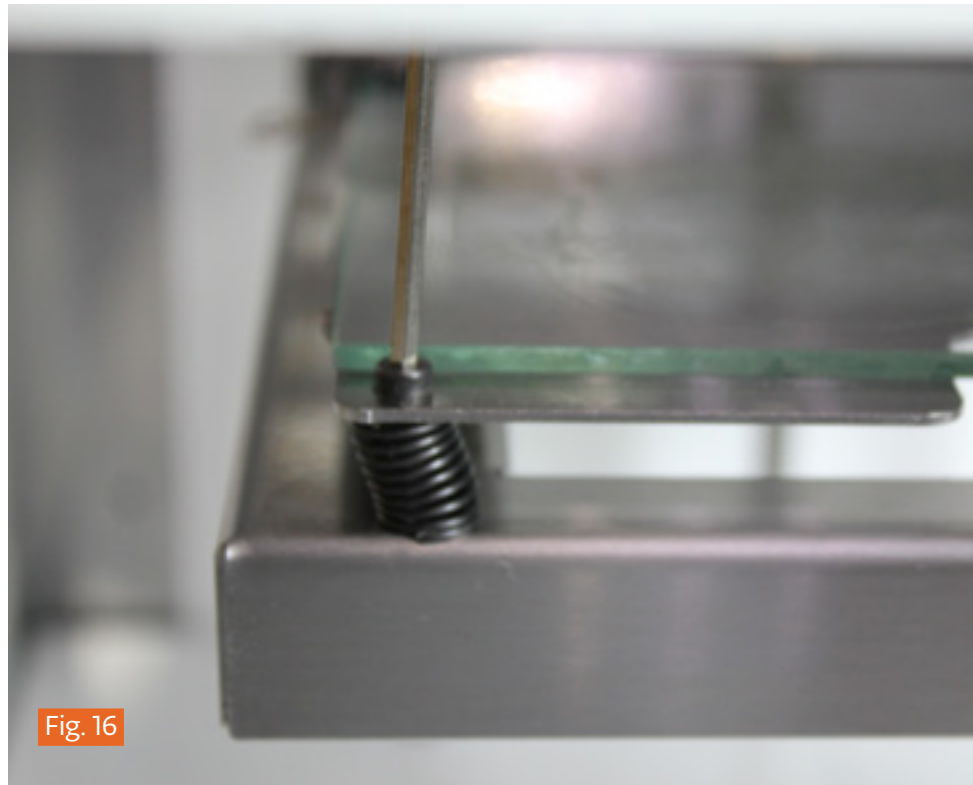


Fig. 16

SHELL AND FINISHING

Fig. 16

You can launch the G-code file to calibrate the plate. You can download it at www.arduino.cc/materia101 and test the Z carriage. Calibrate the printing bed. To fix the distance between the nozzle and the bed, you must adjust the M4 Z axis adjustment screw .

The printed square designed by the calibration file will allow you to control if the axes are effectively squared. Measure the diagonals and if necessary, untighten two pulleys on one side of the bridge so that you can fasten them. Move the bridge side back and forth to correct the squaring (see chapter 7 fig. 17).

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